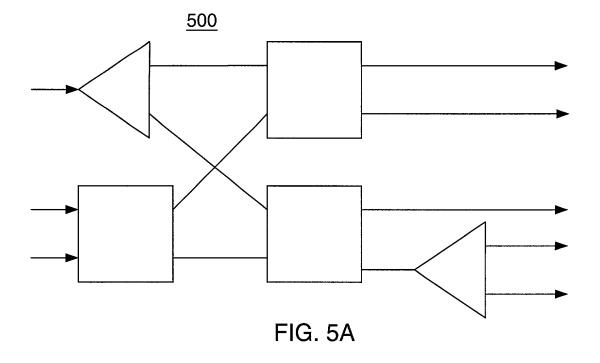


FIG. 4



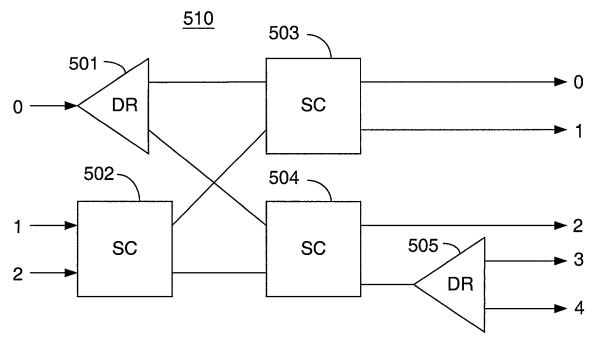


FIG. 5B

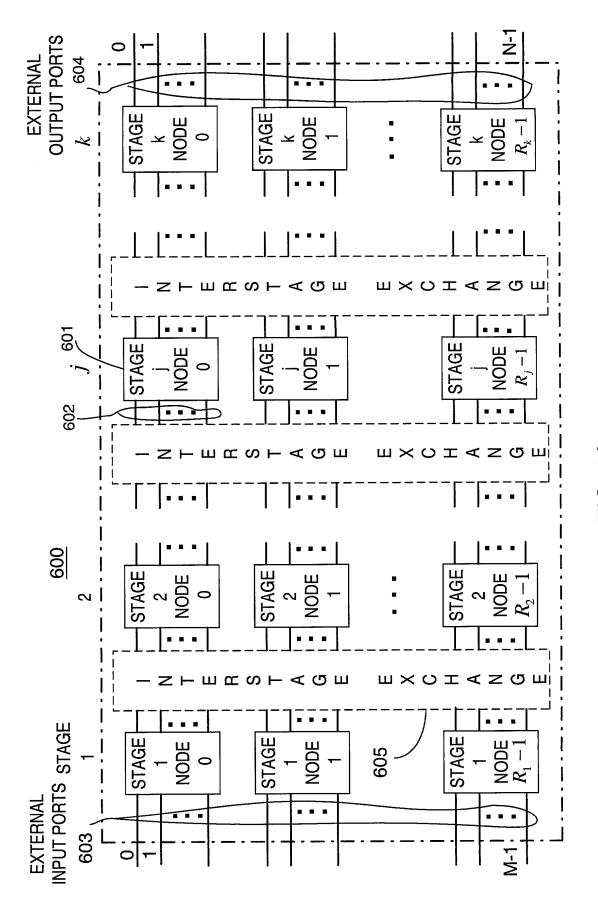
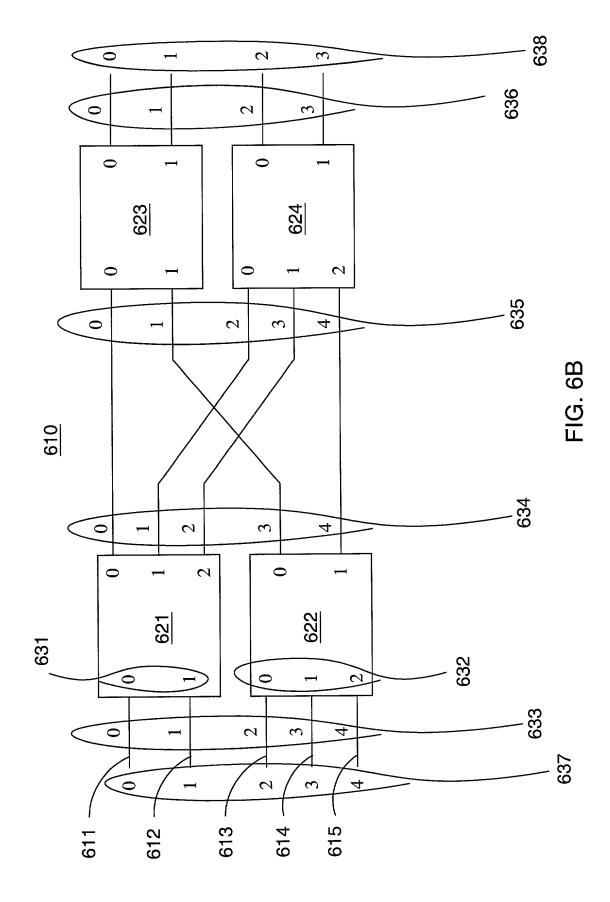
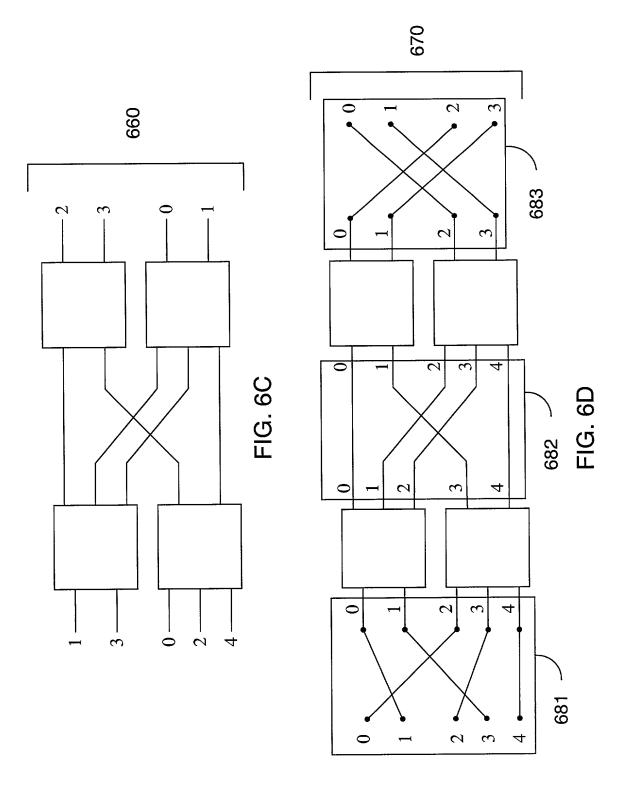
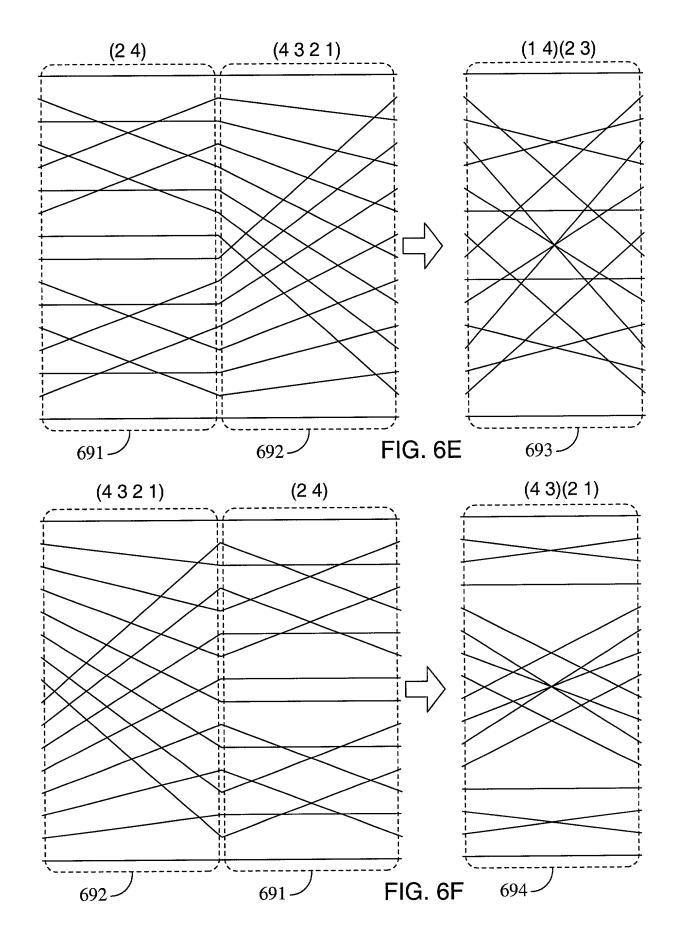
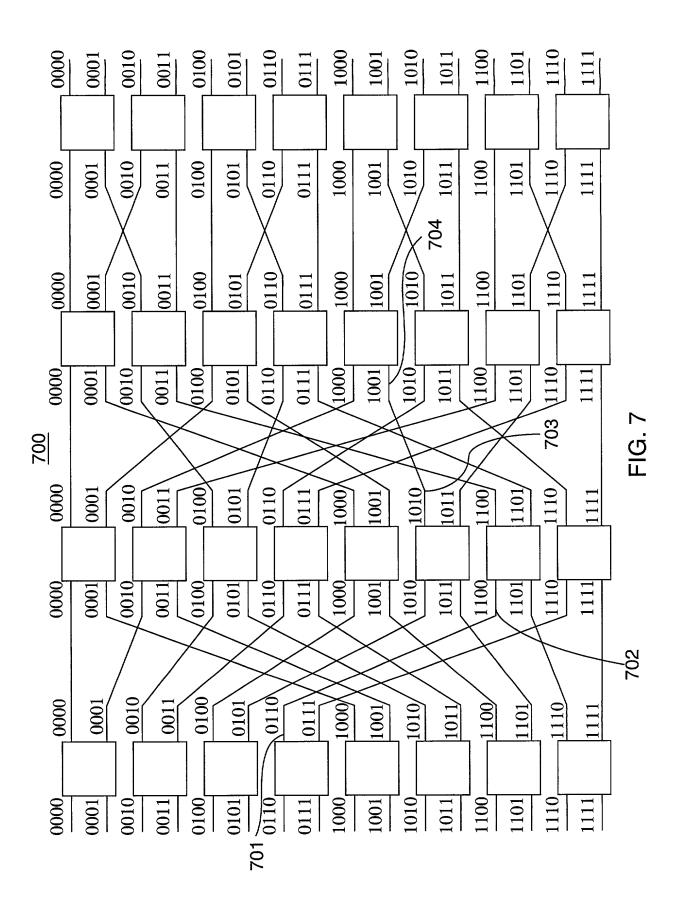


FIG. 6A



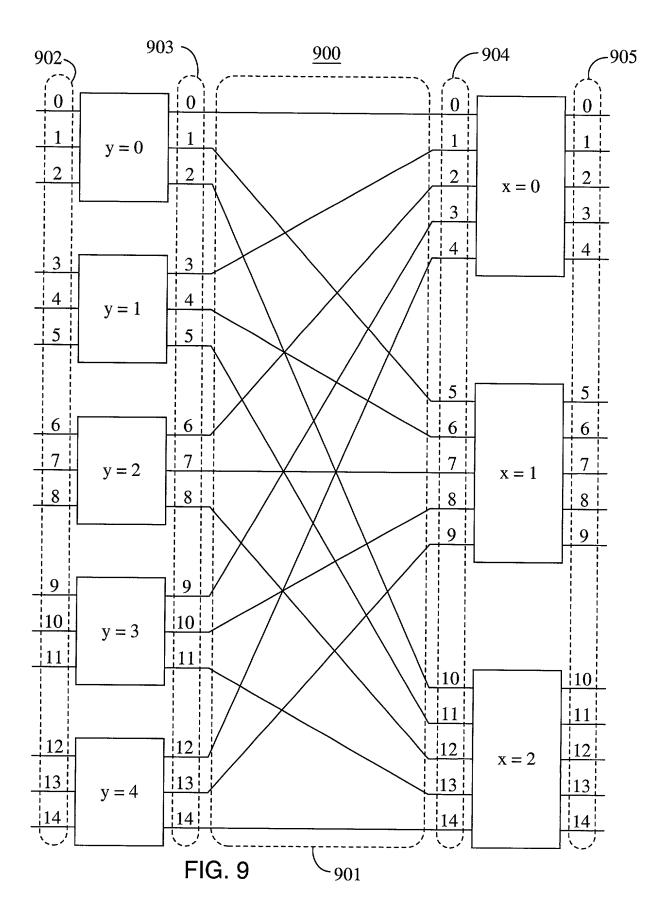


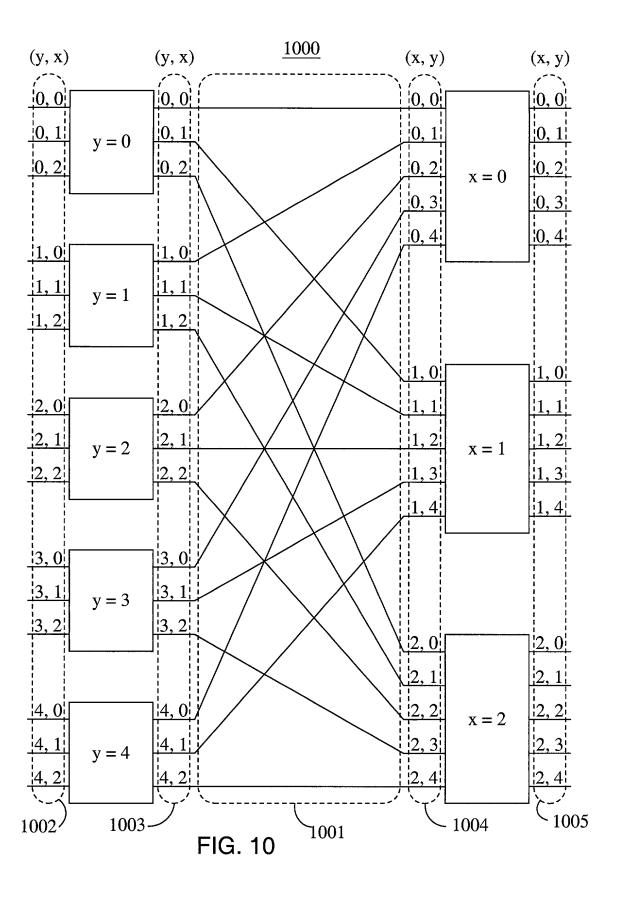


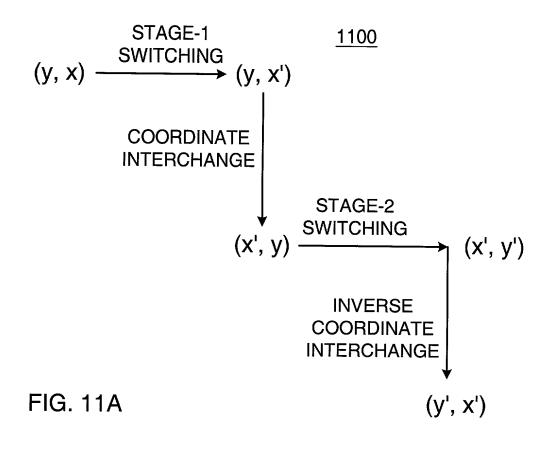


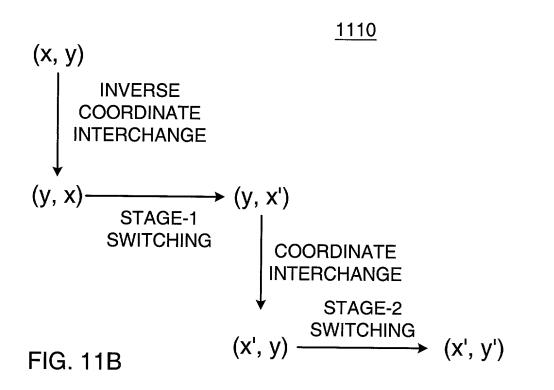
STAGE 1

STAGE 2

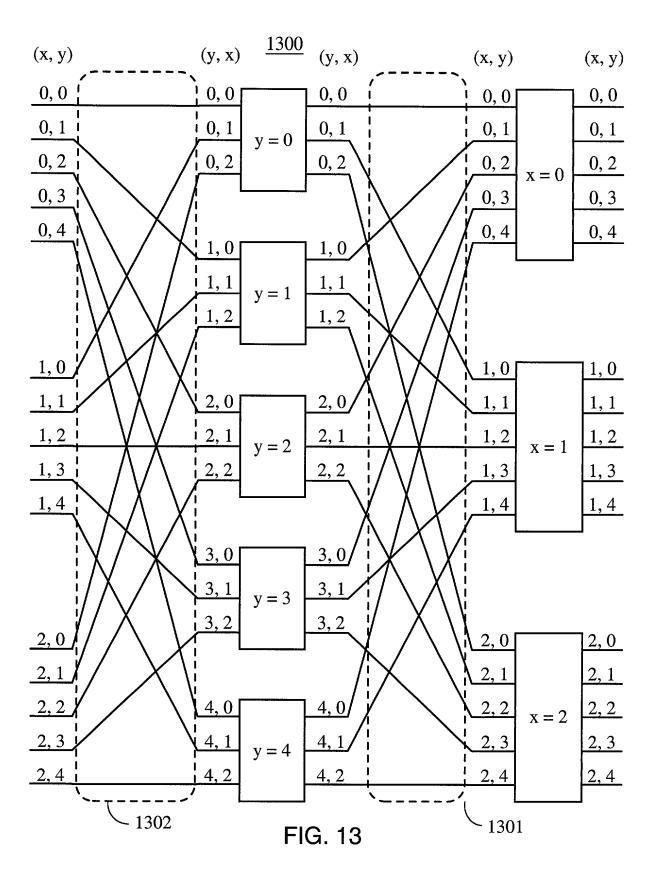


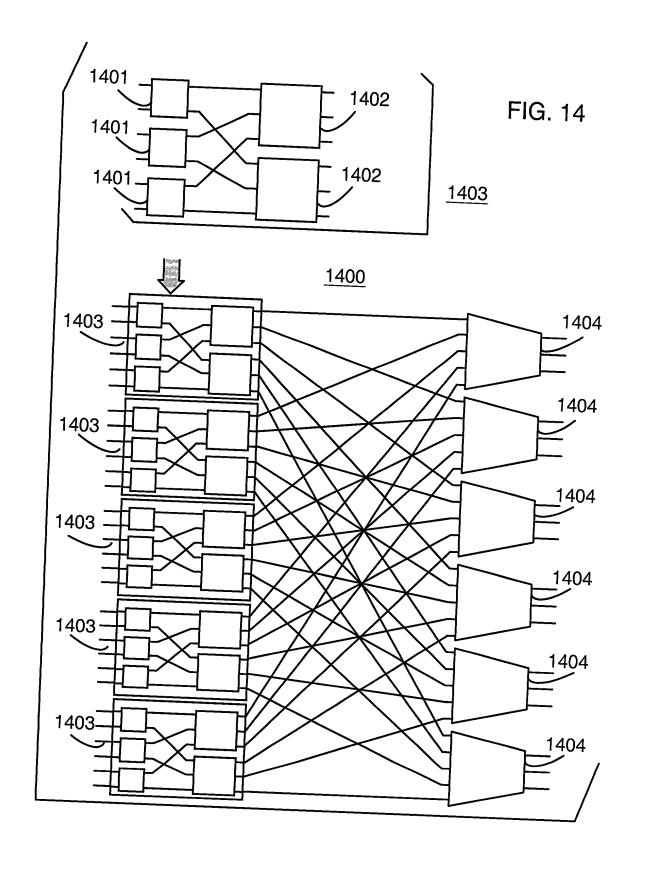






<u>1200</u>





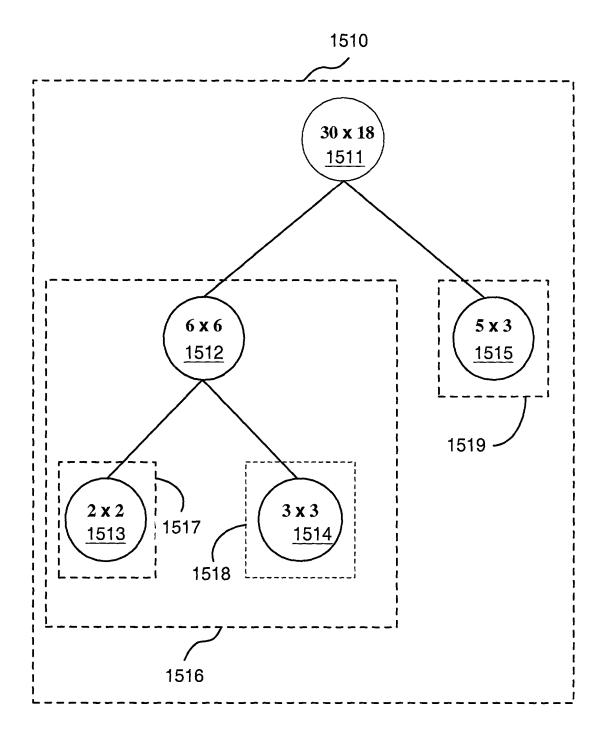
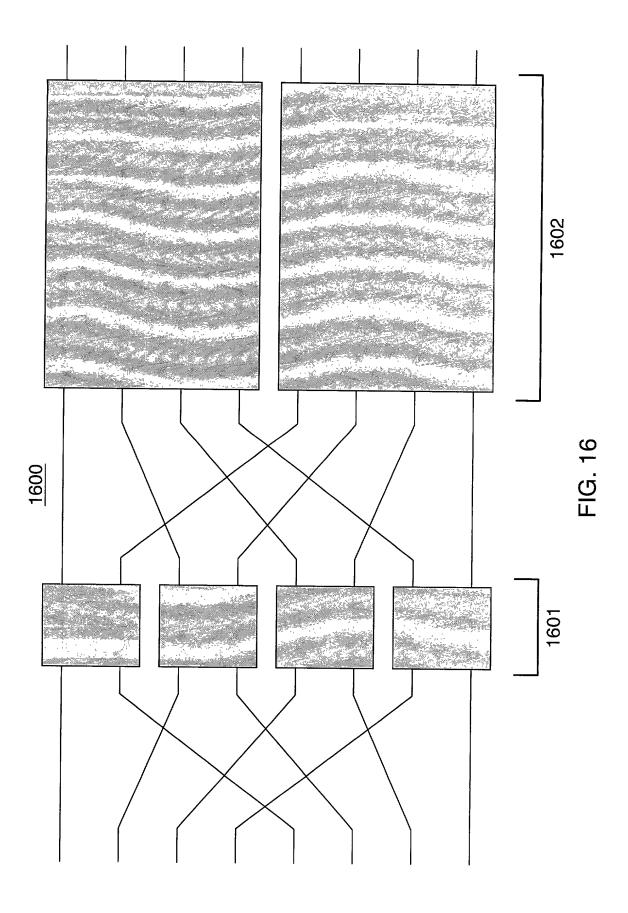
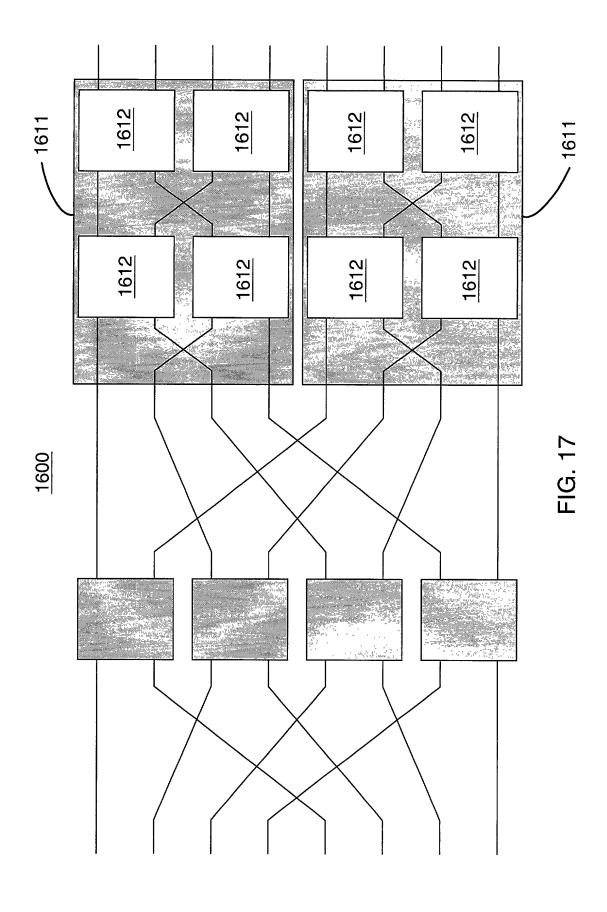


FIG. 15





The first control of the control of

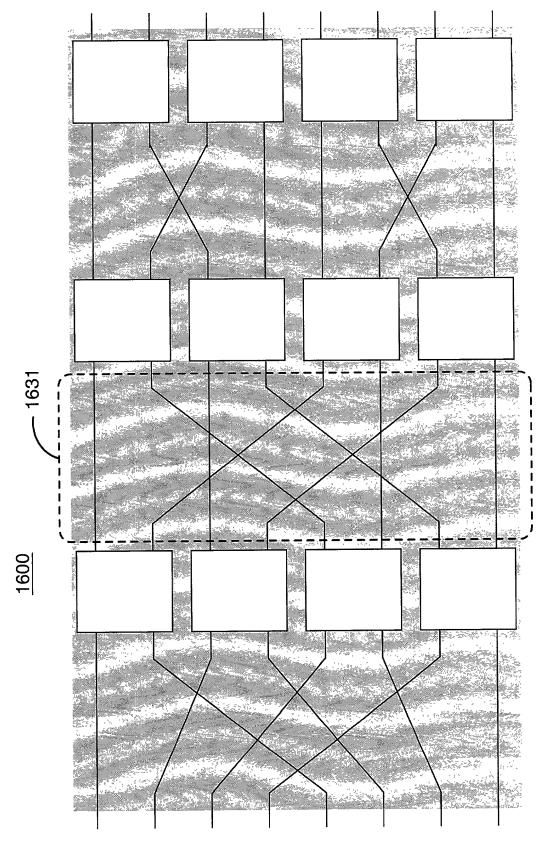


FIG. 19

## <u>2000</u>

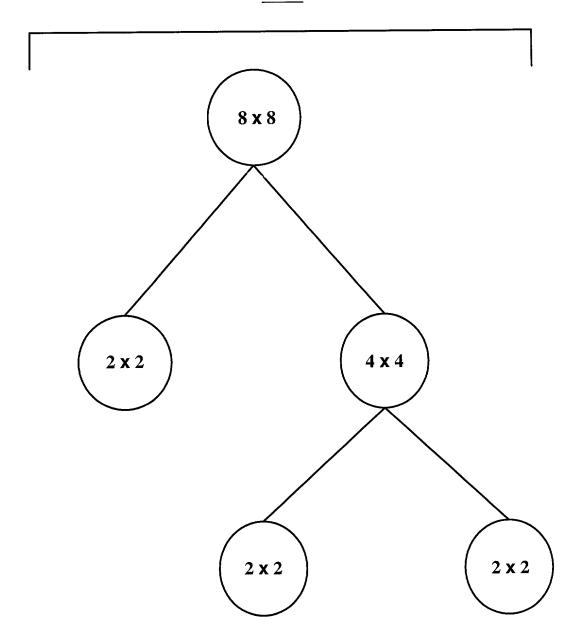
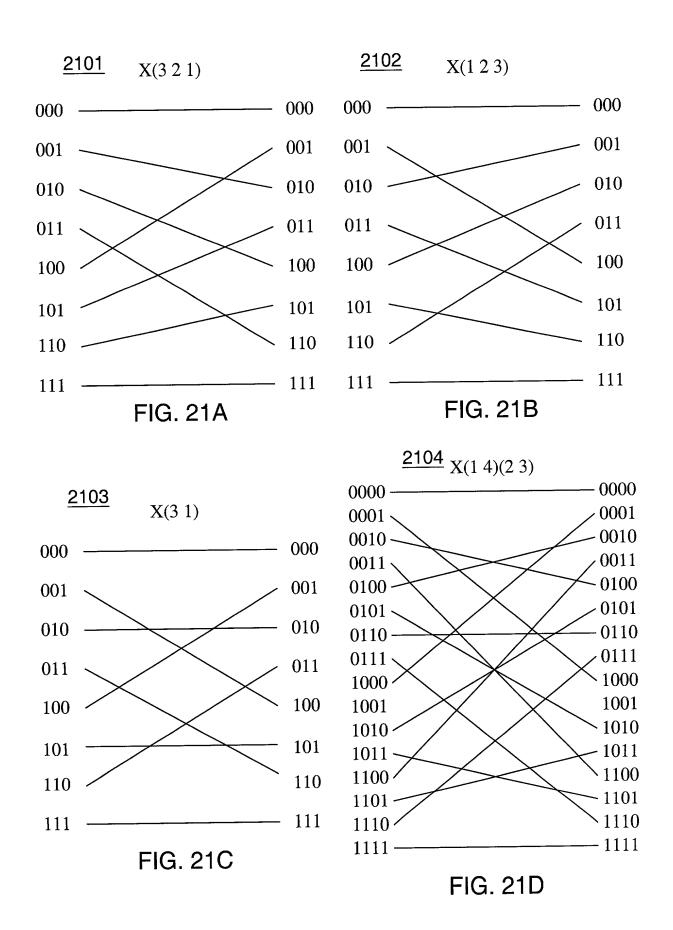
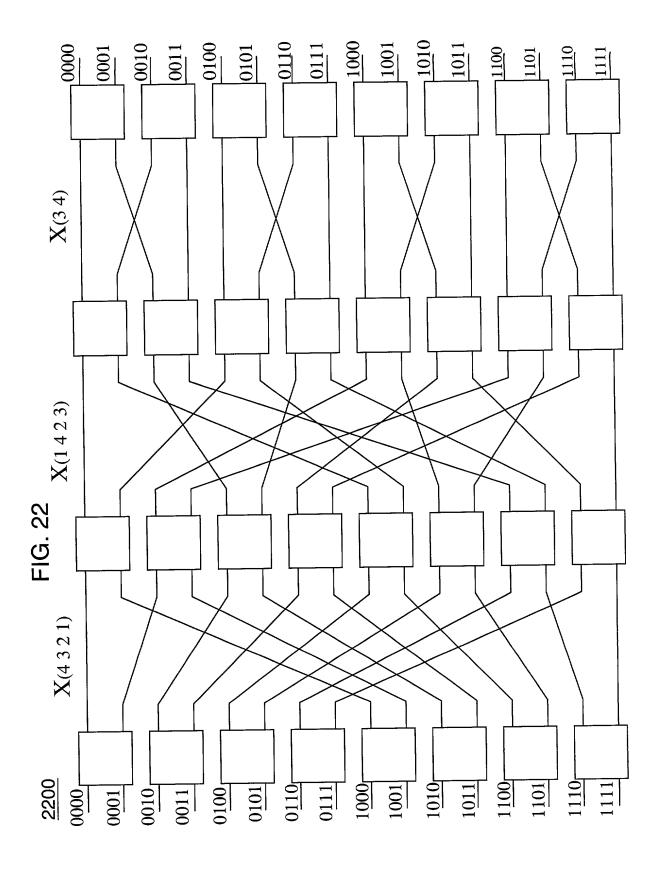
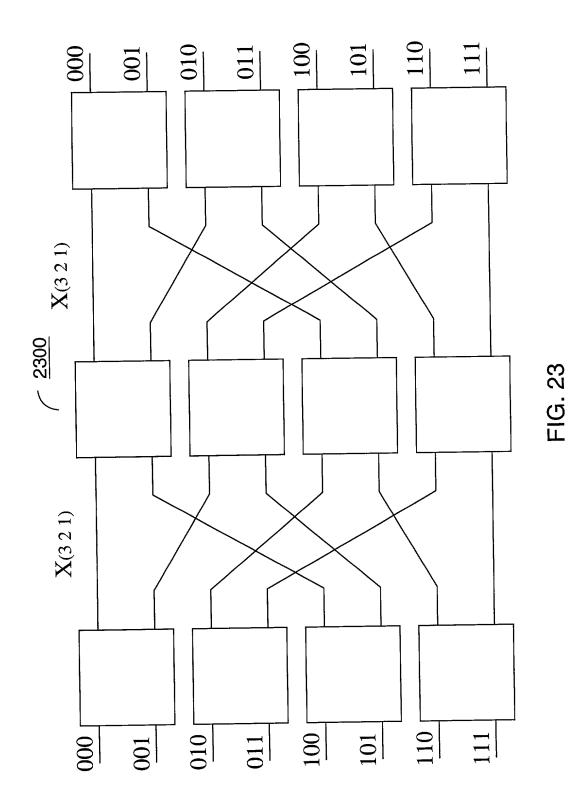


FIG. 20







## <u>2400</u>

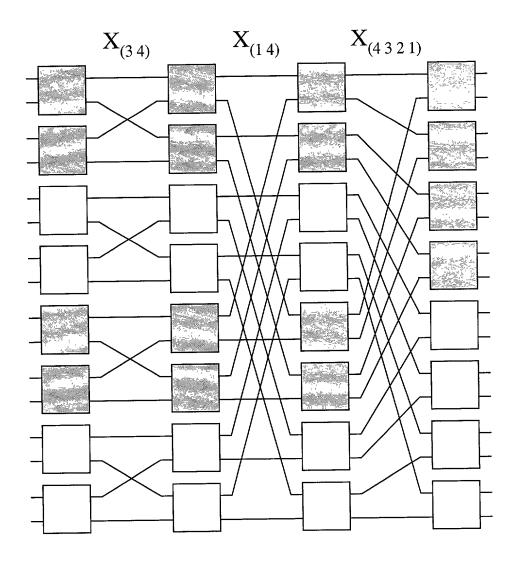
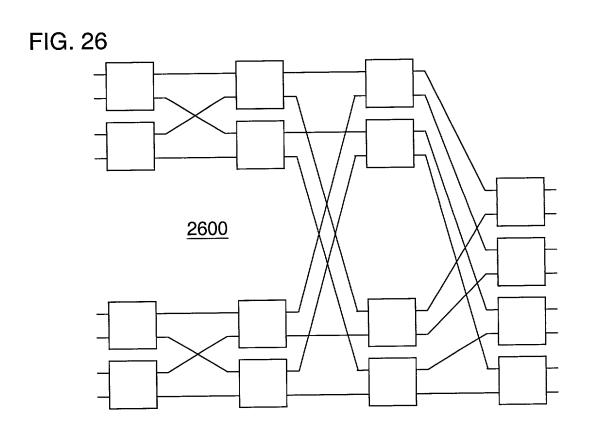
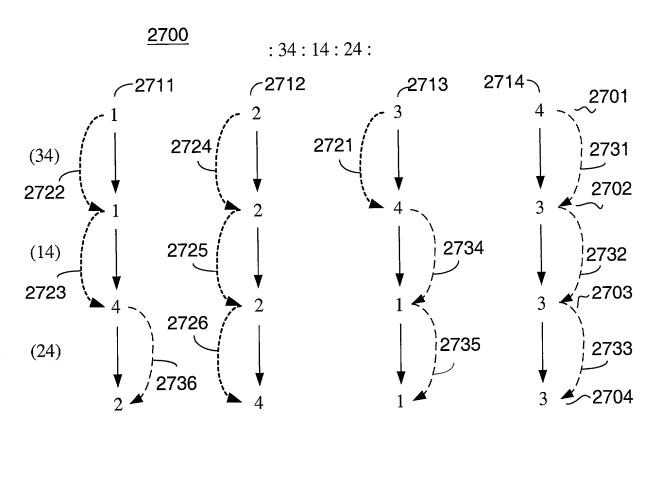


FIG. 24

2500





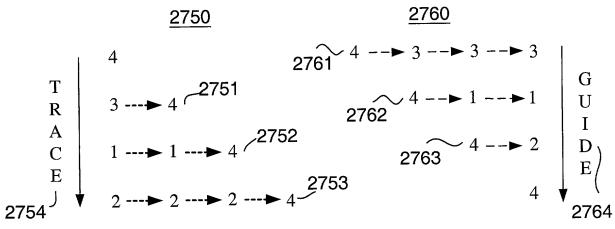


FIG. 27

Trace 
$$\begin{pmatrix} 4321 \end{pmatrix} : (14) : (24) : (34) : \\ 1 \longrightarrow 4 \\ 2 \longrightarrow 1 \longrightarrow 4 \\ 3 \longrightarrow 2 \longrightarrow 2 \longrightarrow 4 \\ 4 \longrightarrow 3 \longrightarrow 3 \longrightarrow 3 \longrightarrow 4$$

FIG. 28A

$$(4321) : (14) : (24) : (34) :$$

$$4 \longrightarrow 1 \longrightarrow 1 \longrightarrow 1$$

$$4 \longrightarrow 2 \longrightarrow 2$$

$$4 \longrightarrow 3$$

$$4 \longrightarrow 3$$

$$4 \longrightarrow 3$$

FIG. 28B

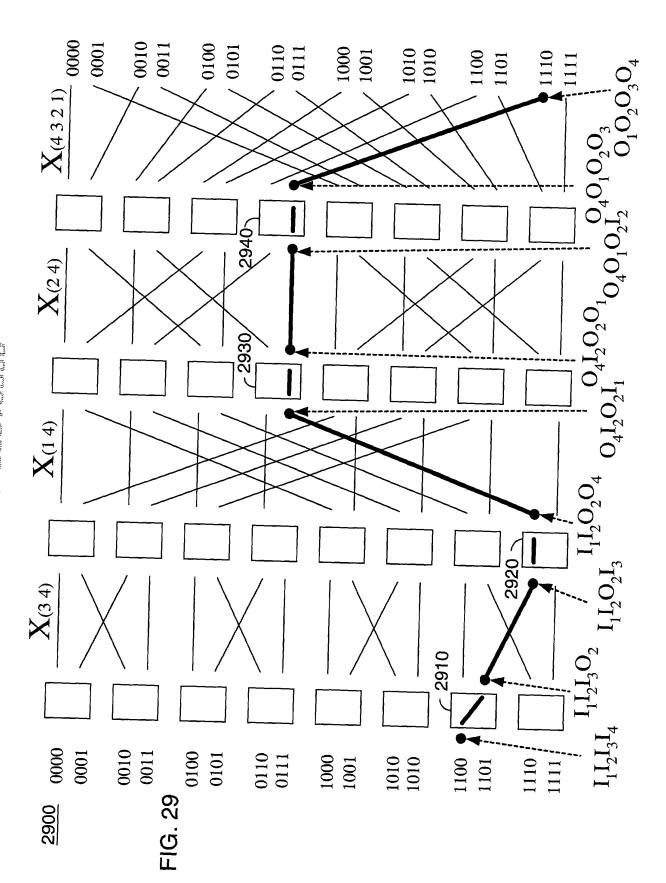
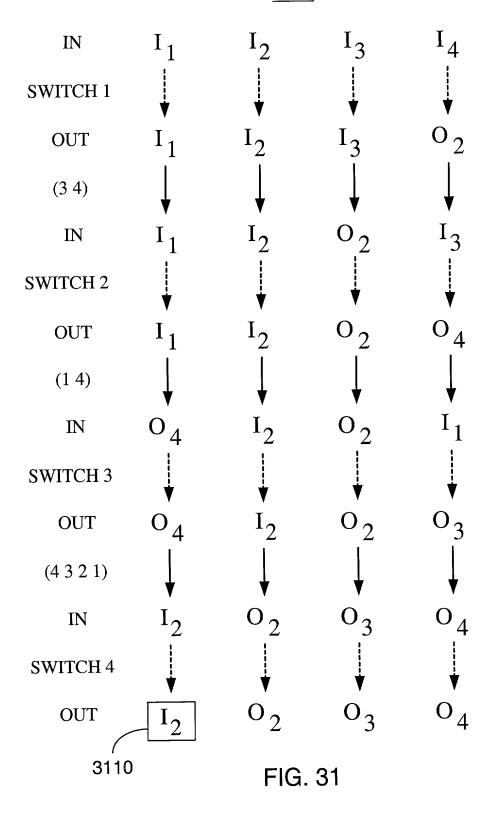


FIG. 30A

FIG. 30B

## <u>3100</u>



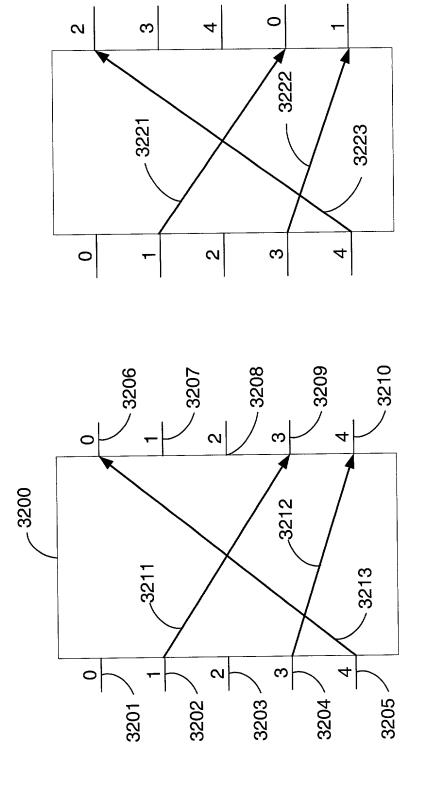
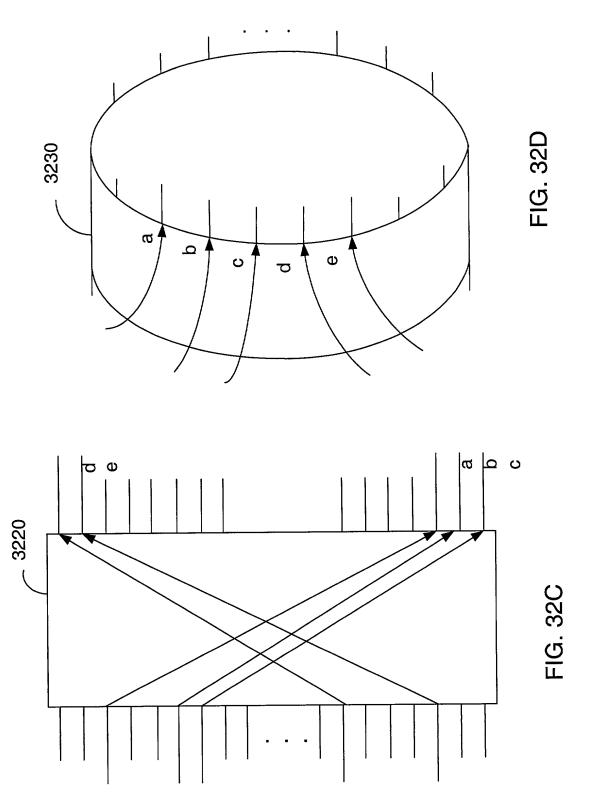
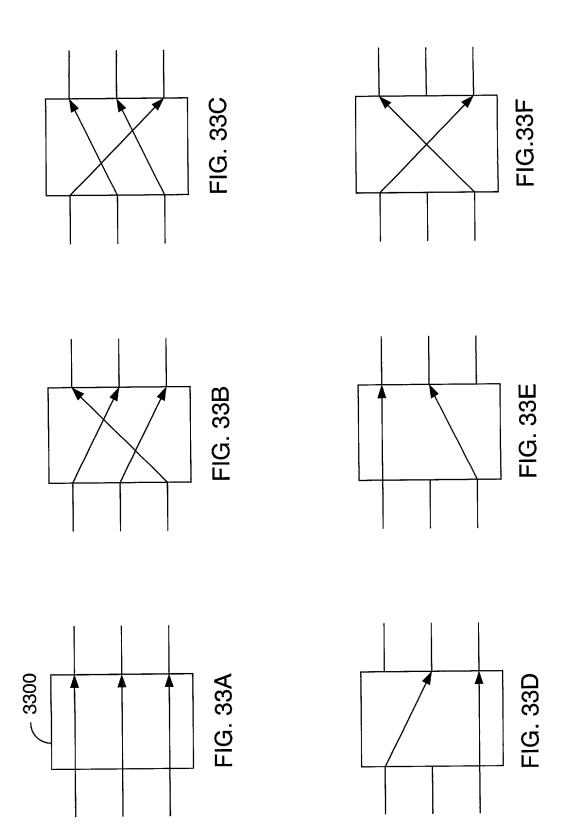


FIG. 32B

FIG. 32A





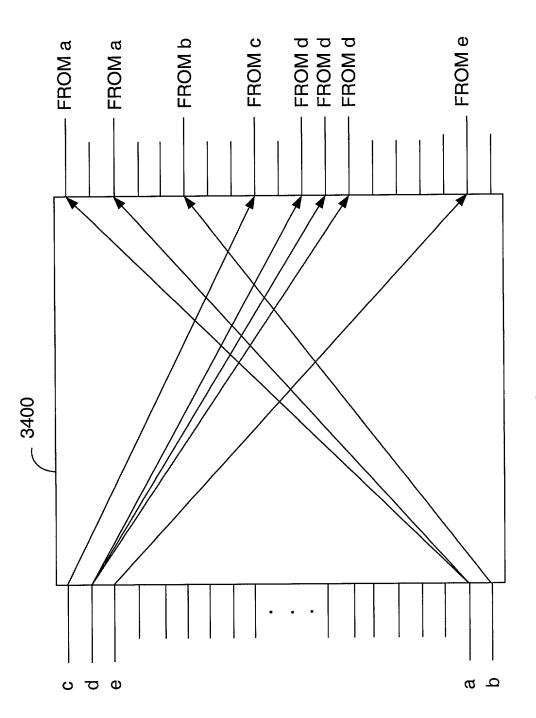
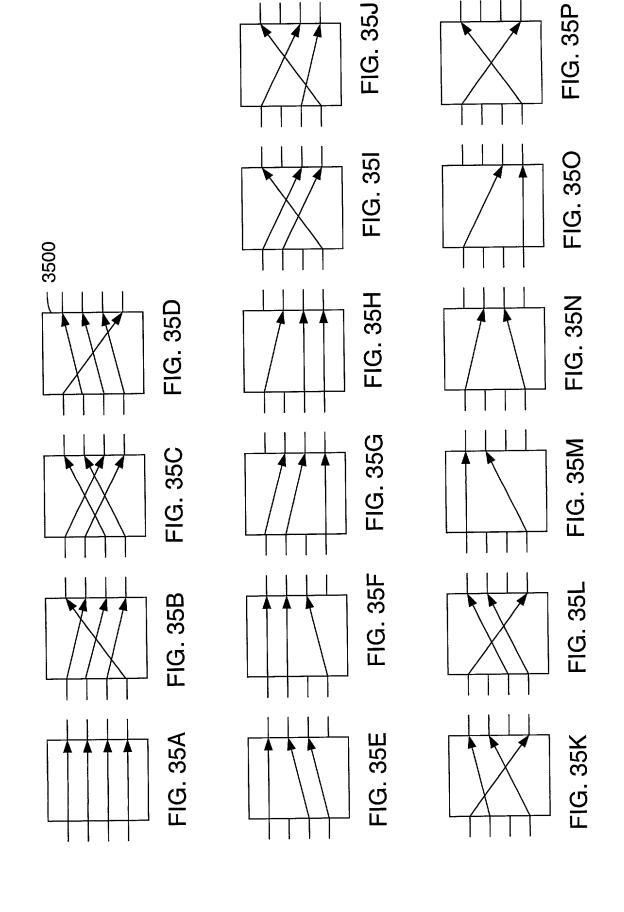
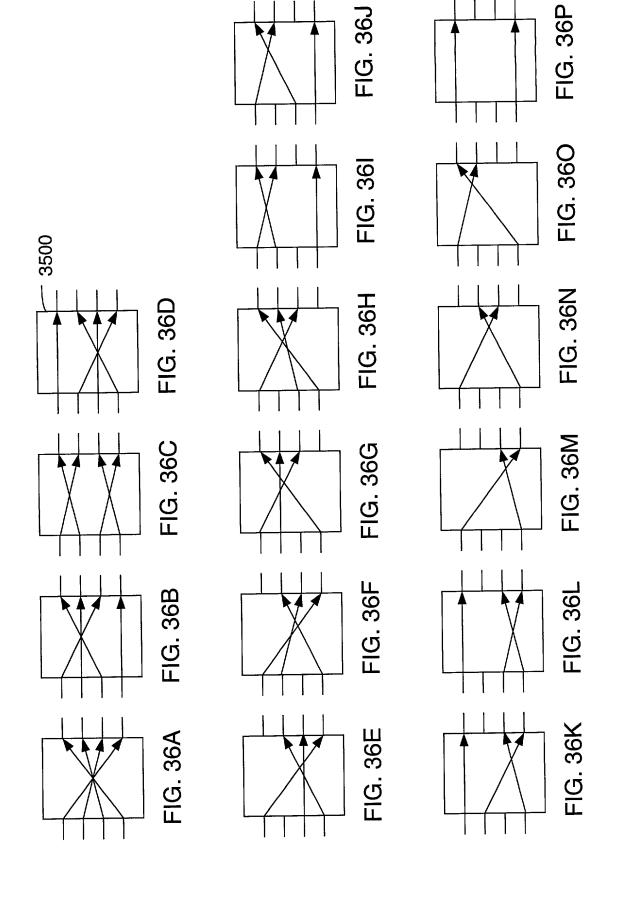
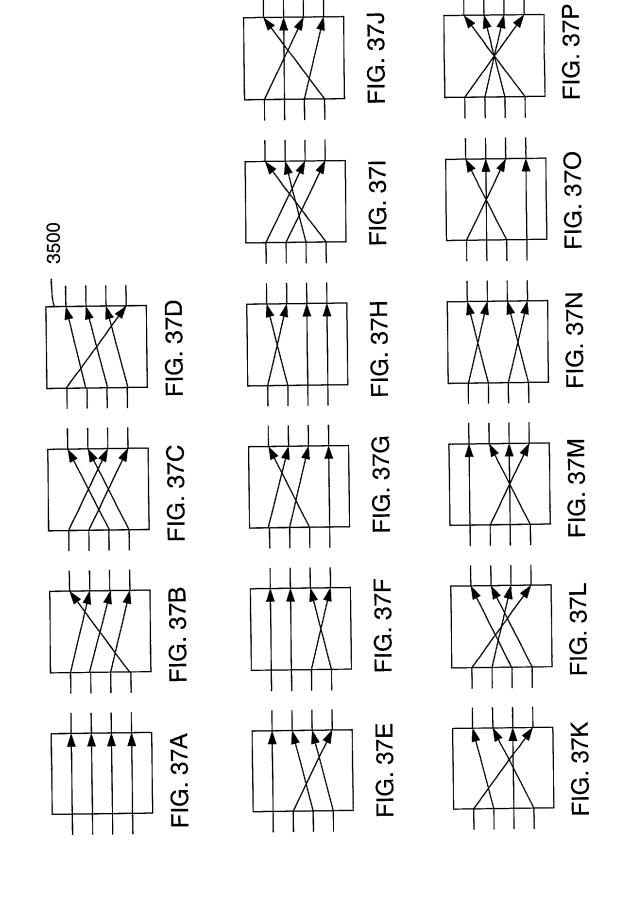
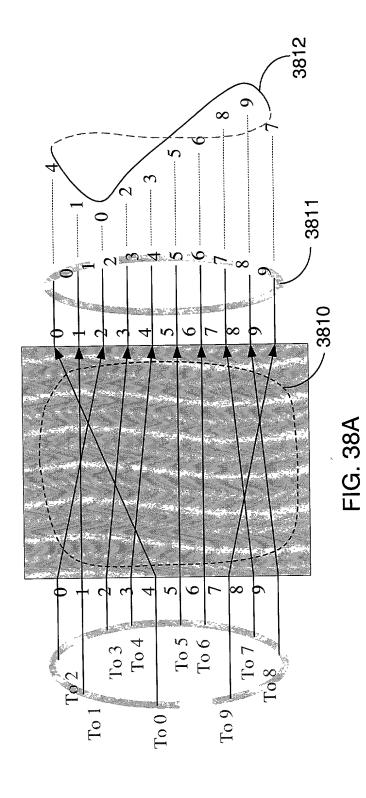


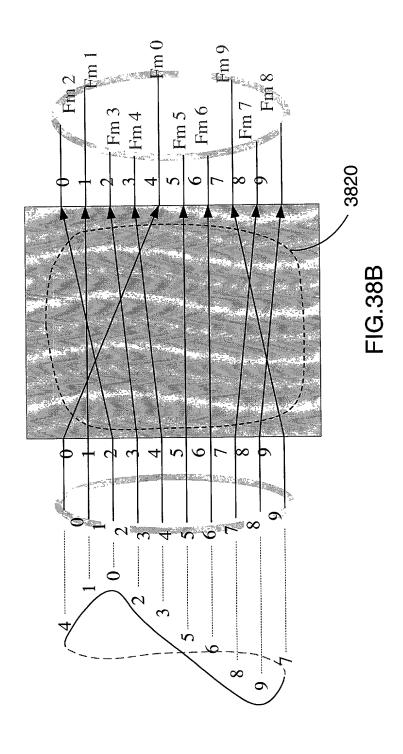
FIG. 34











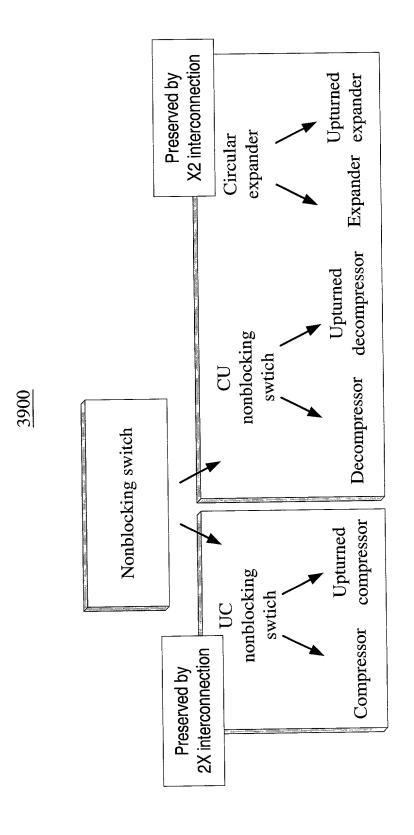


FIG. 39

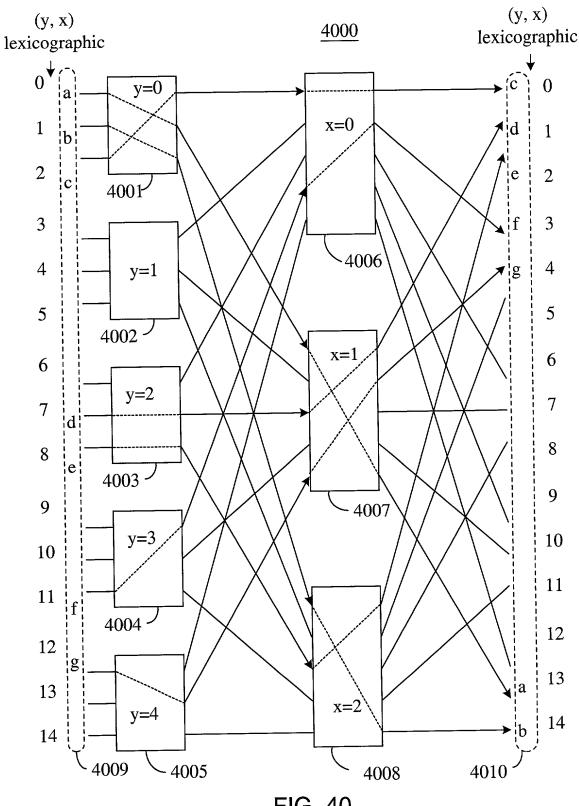


FIG. 40

#### 4100

Preservation of the (1) compressor, (2) upturned compressor and (3) UC nonblocking properties of a switch

Recursive 2X constructions from arbitrary building blocks

Recursive 2X constructions from cells

Banyan-type networks with monotonically decreasing trace and guide

#### 4110

Preservation of the (4) decompressor,

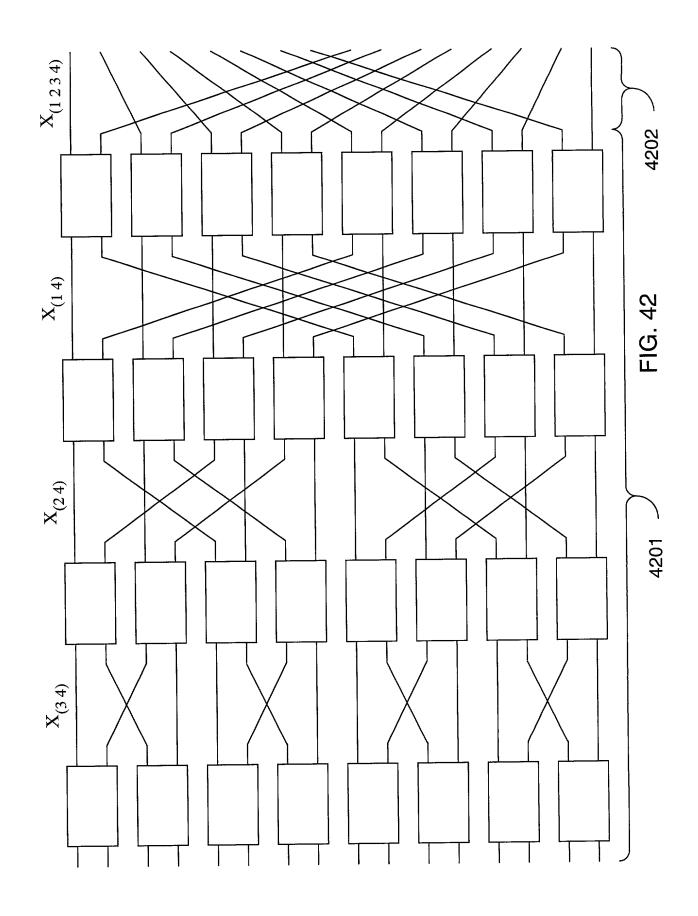
- (5) upturned decompressor,
  - (6) CU nonblocking, (7) expander,
- (8) upturned expander and
  - (9) circular expander properties of a switch

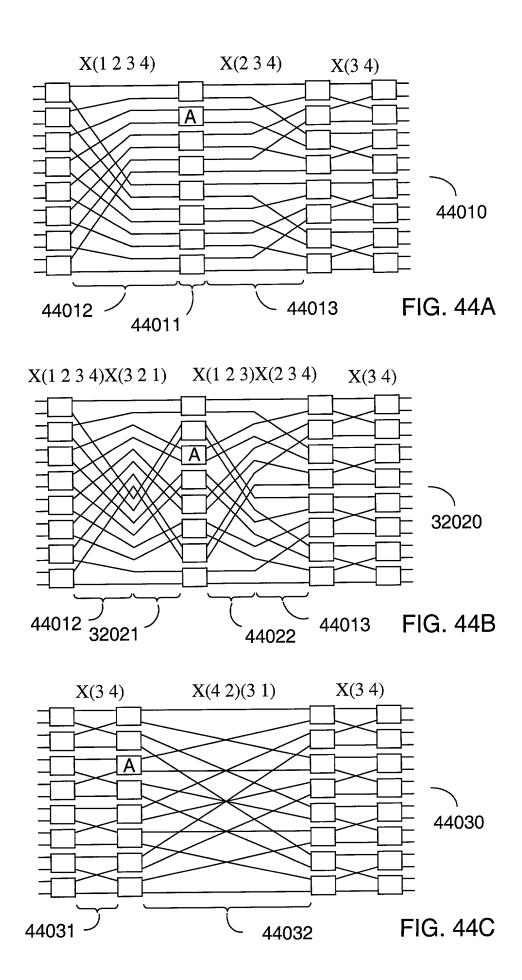
Recursive X2 constructions from arbitrary building blocks

Recursive X2 constructions from cells

Banyan-type networks with monotonically increasing trace and guide

FIG. 41





Equivalence banyan-type in stronger networks among sense match of output exchange only (<==> common guide among Equivalence requiring the the networks) (<==> common trace and guide Equivalence without requiring the match of I/O exchanges Equivalence requiring the match of I/O exchanges among the networks) (unconditional) match of input exchange only (<==> common trace among Equivalence requiring the the networks) 4500

FIG. 45

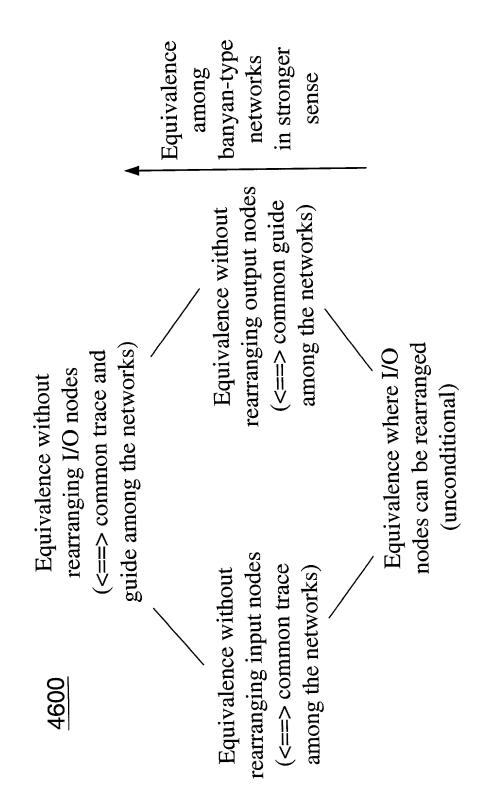


FIG. 46

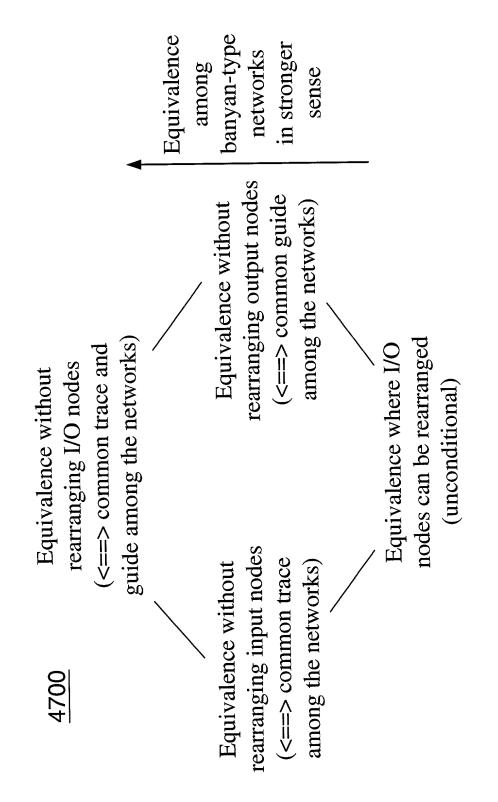
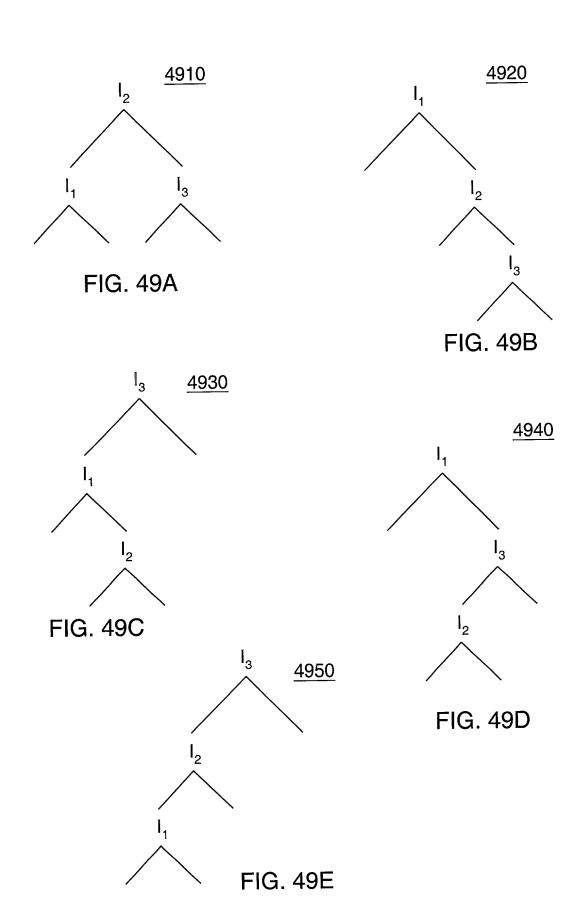
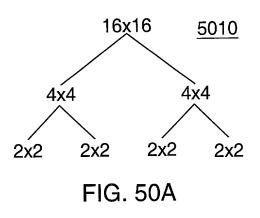


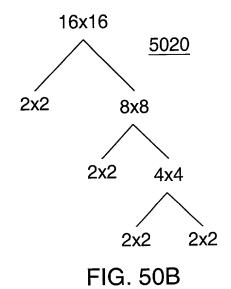
FIG. 47

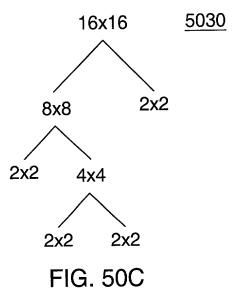
Equivalence among bitpermuting in stronger networks sense rearranging output nodes (<==> common guide among the networks) Equivalence without (<==> trace and guide of one network can be repsectively changed to that of the other Equivalence where I/O nodes can be network by a permutation) guide among the networks) (<==> common trace and rearranging I/O nodes Equivalence without rearranged rearranging input nodes (<==> common trace among the networks) Equivalence without

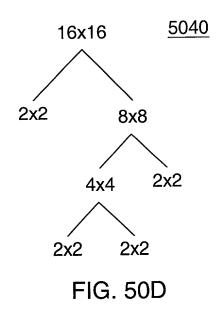
FIG. 48

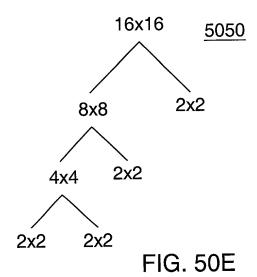












## <u>5100</u>

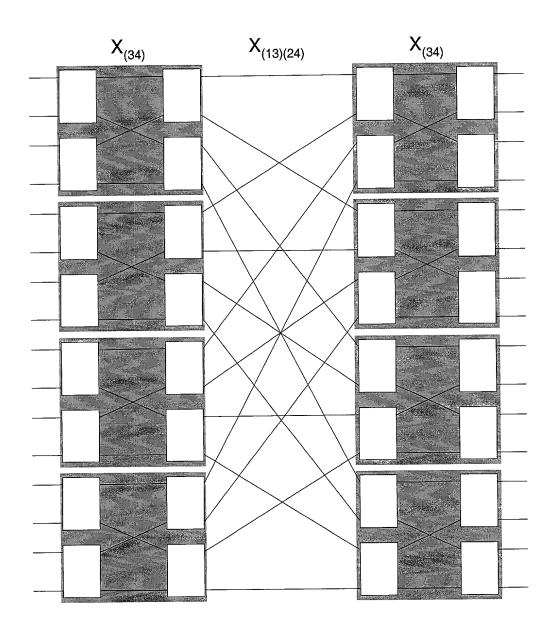


FIG. 51

## <u>5200</u>

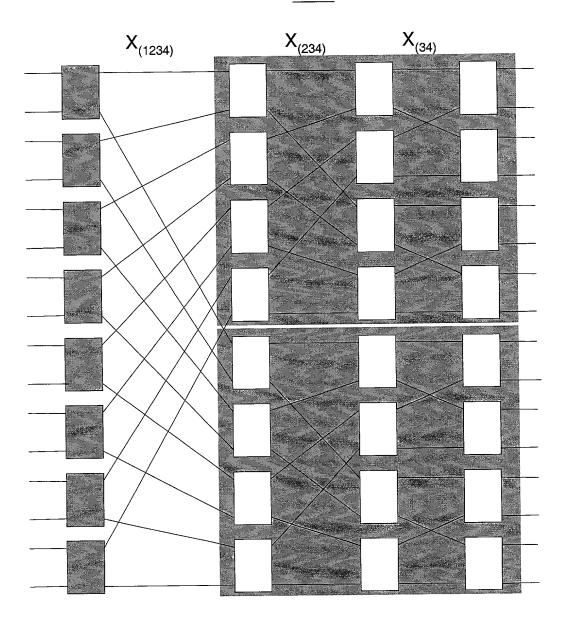
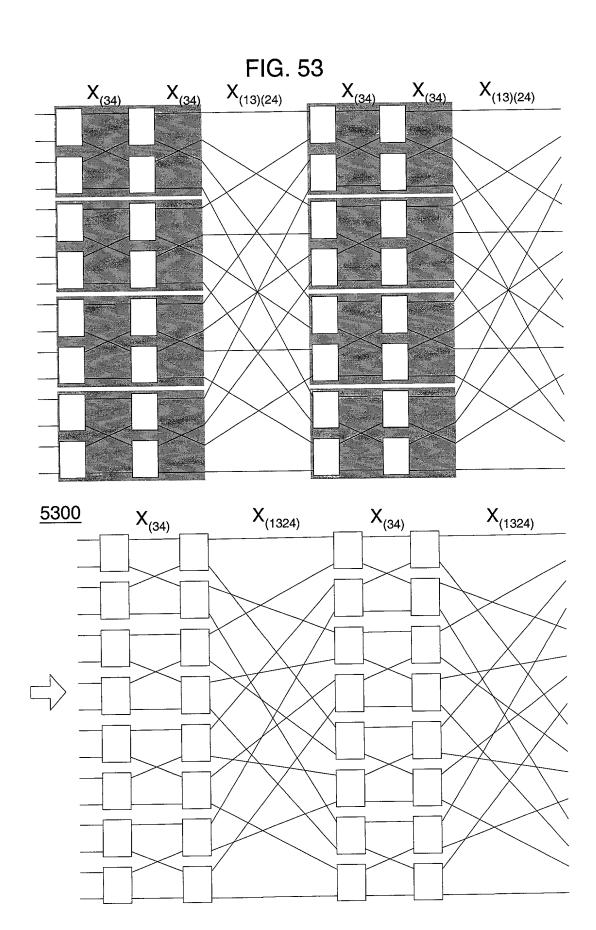


FIG. 52



#### <u>5400</u>

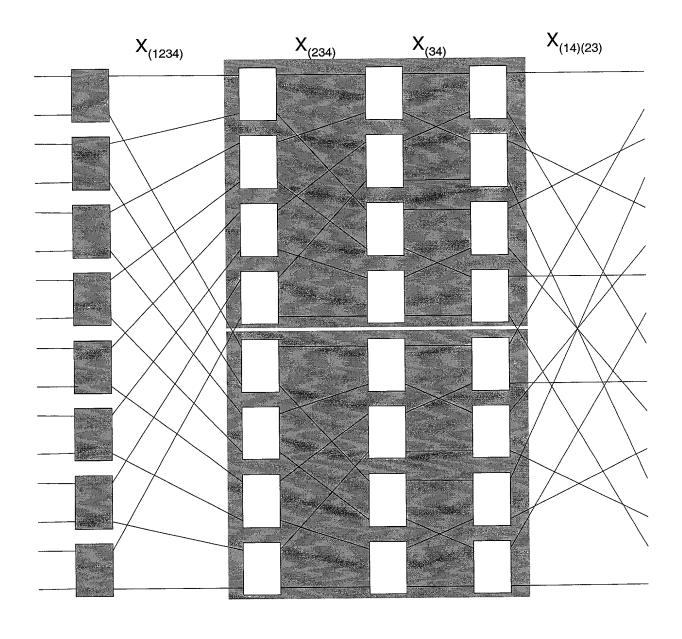


FIG. 54

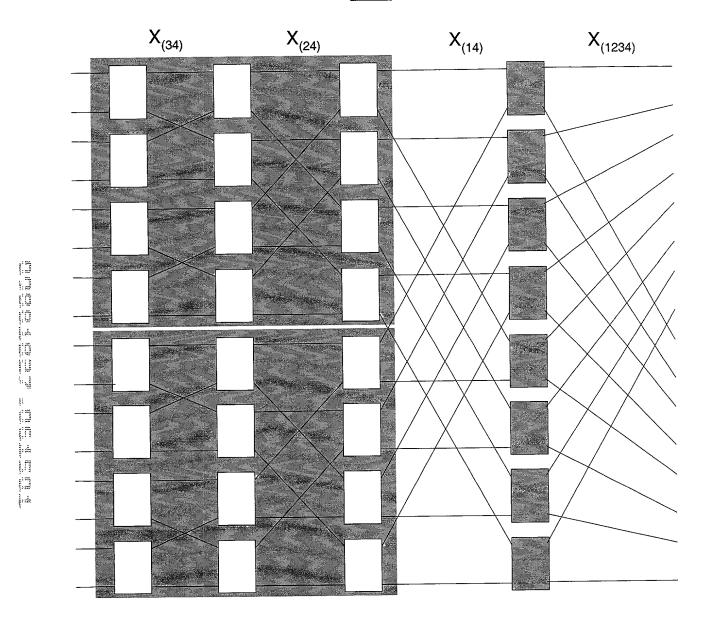
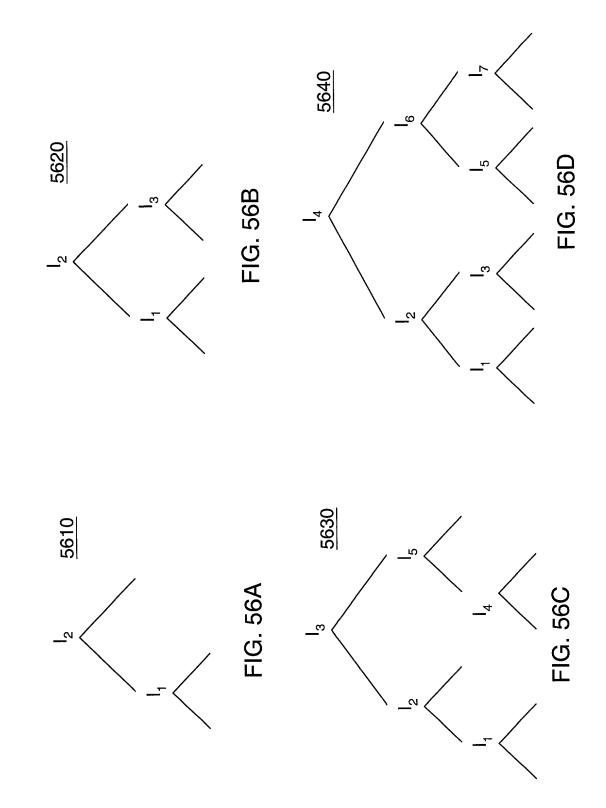
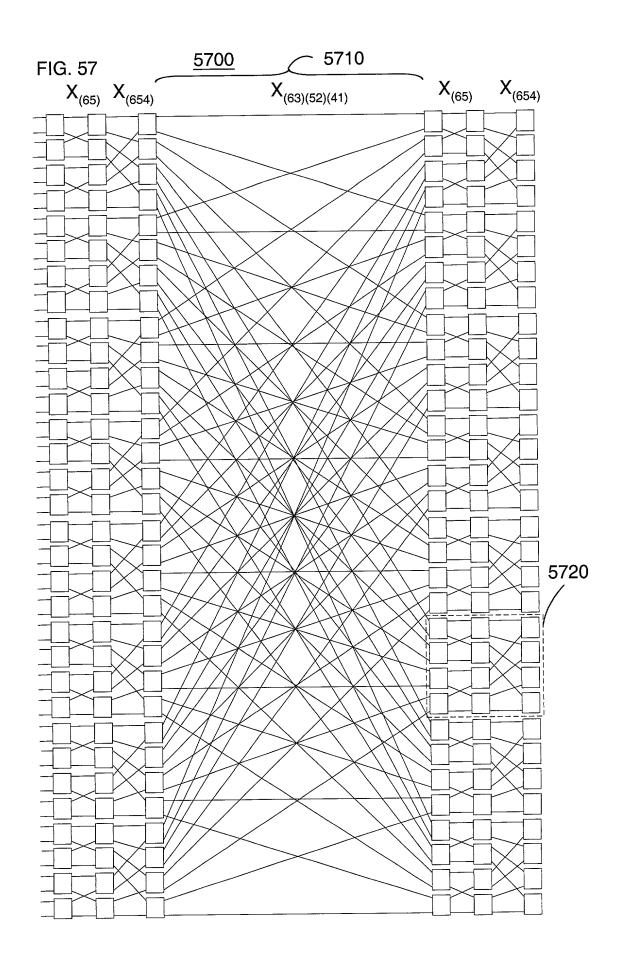
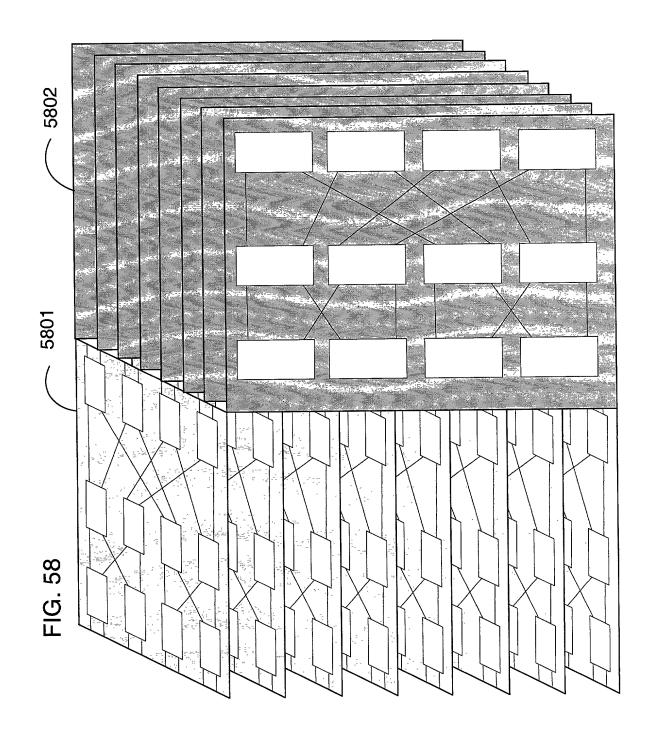
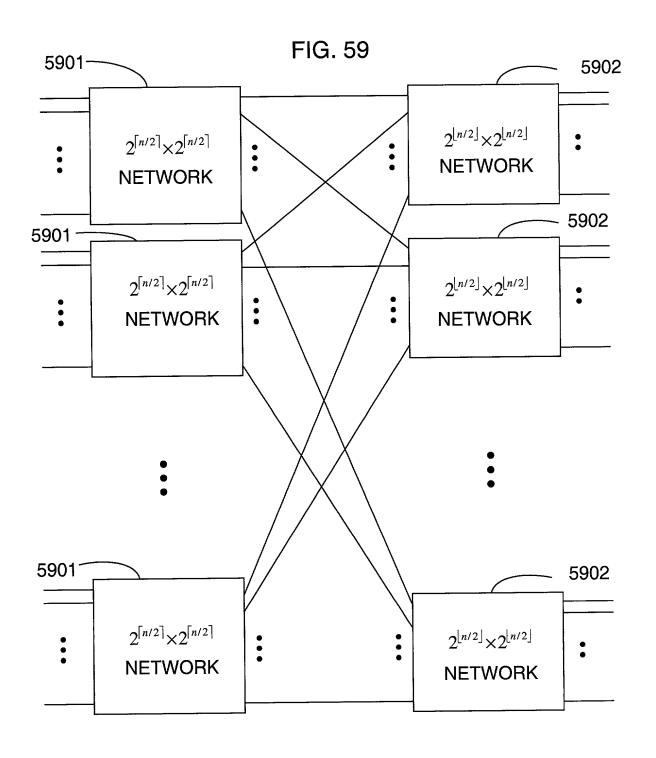


FIG. 55









# <u>6000</u>

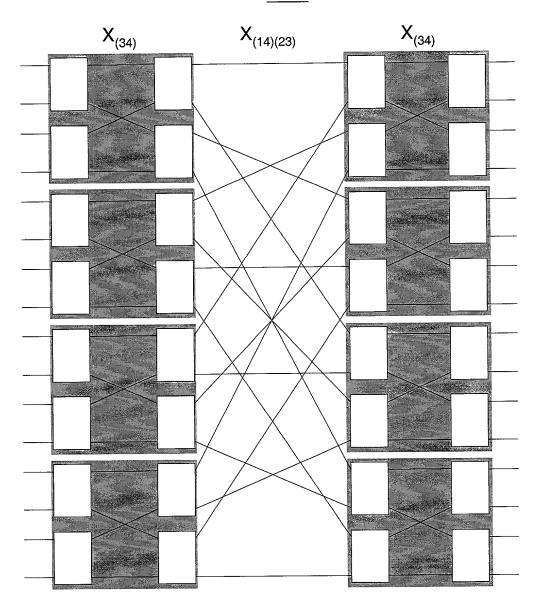


FIG. 60

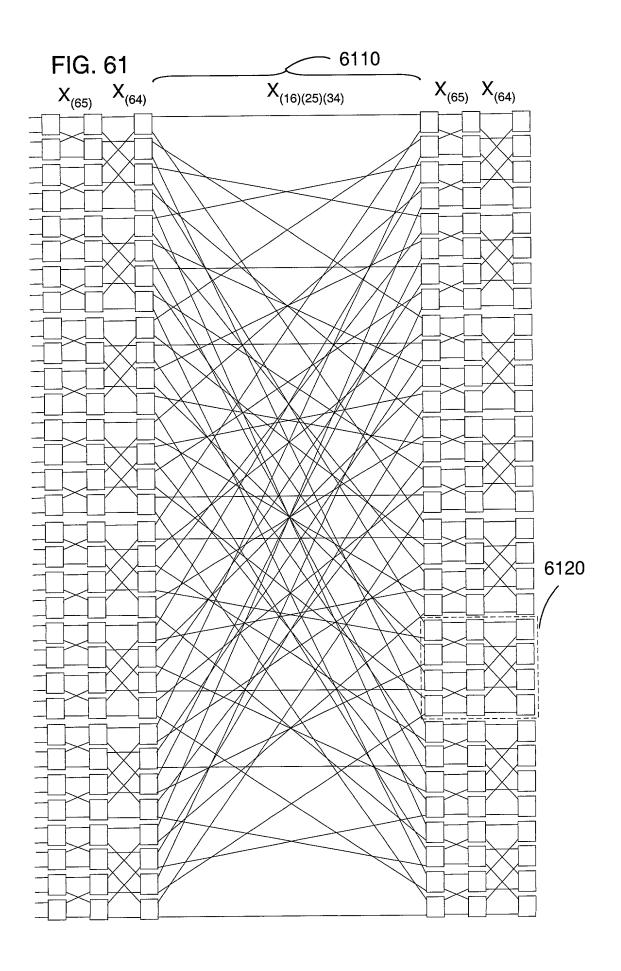


FIG. 62A

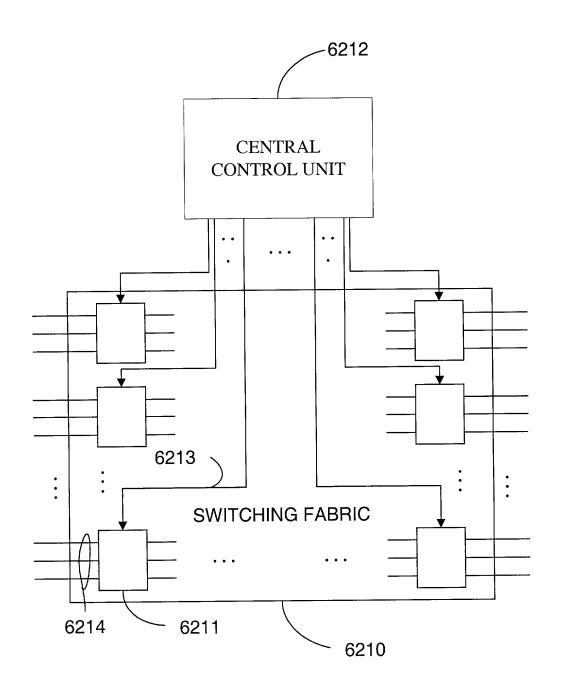
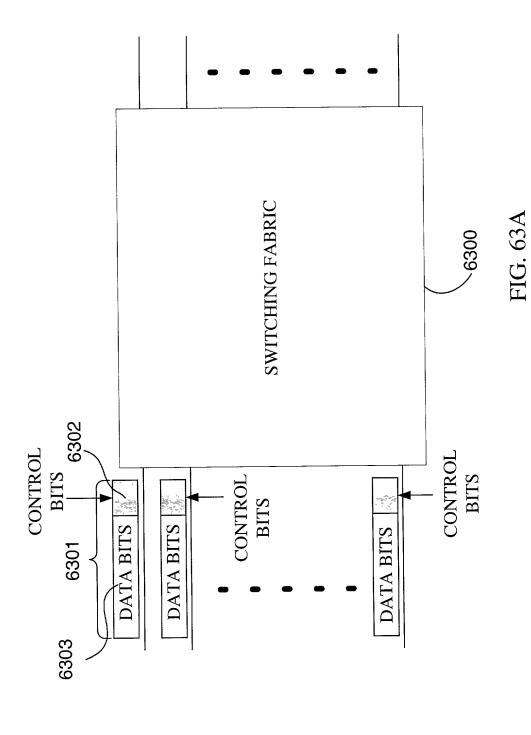


FIG. 62B



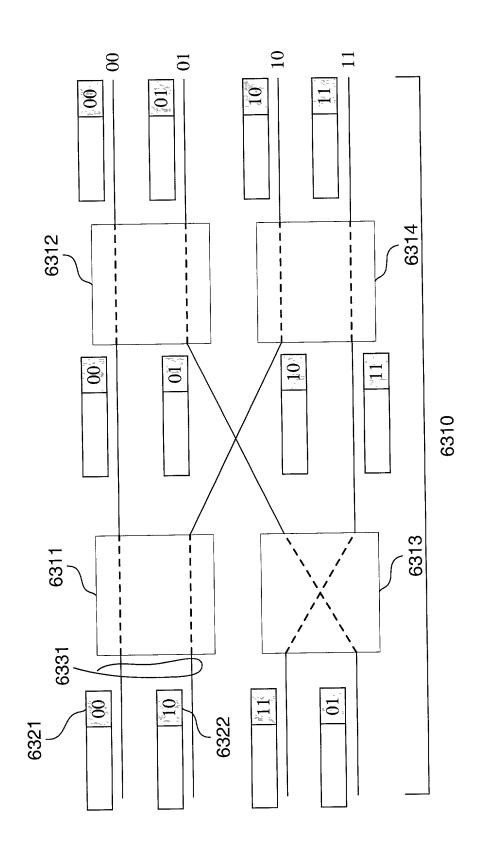


FIG. 63B

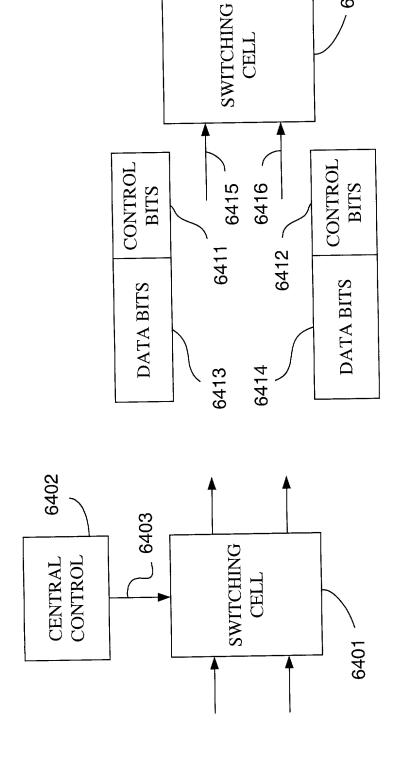
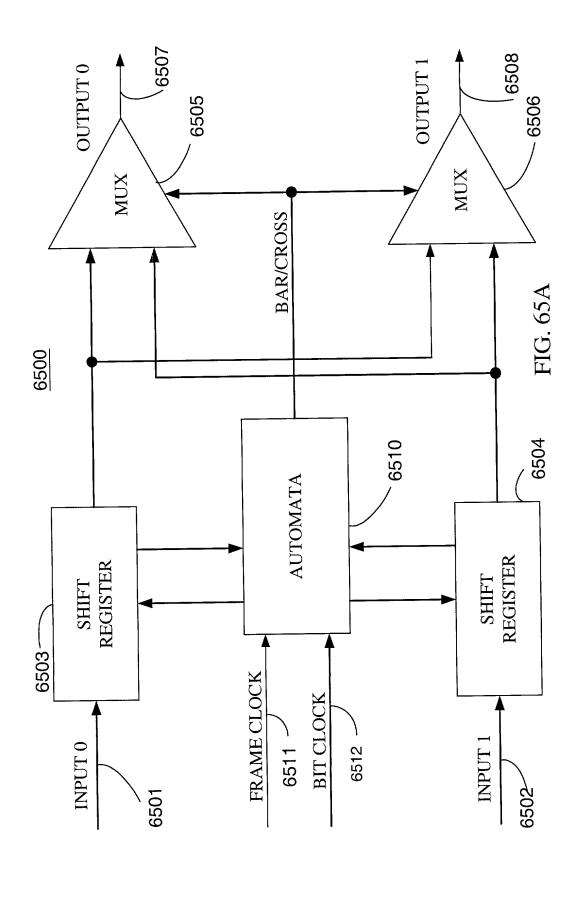


FIG. 64B

FIG. 64A

- 6417



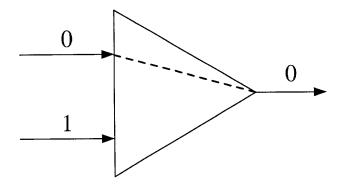


FIG. 65B

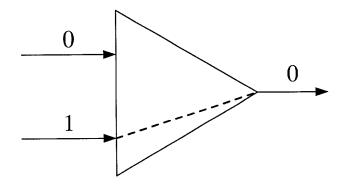


FIG. 65C

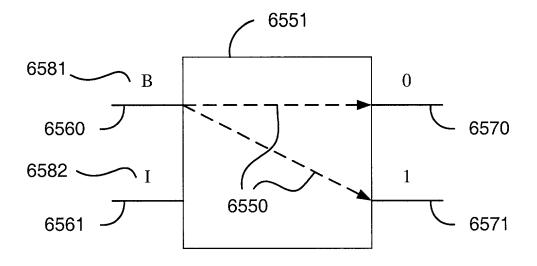


FIG. 65D

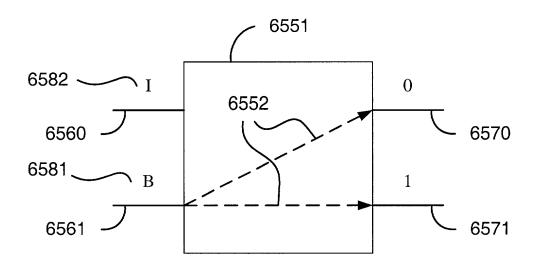


FIG. 65E

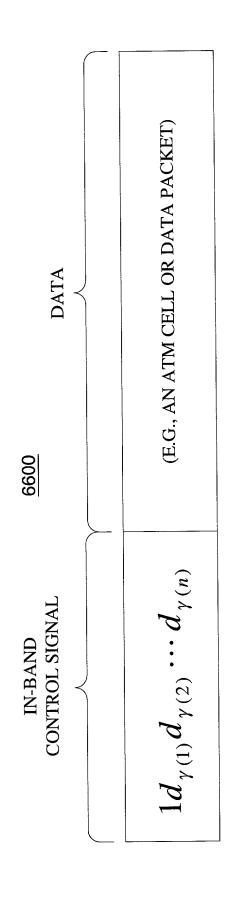


FIG. 66A

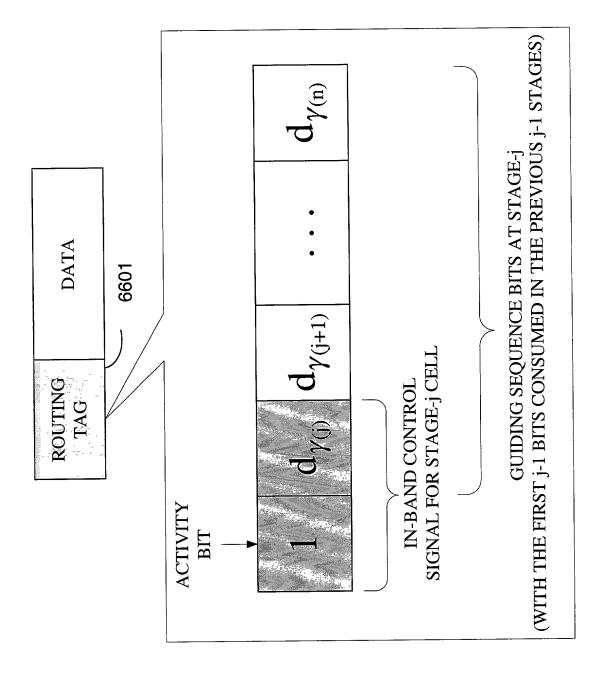


FIG. 66B

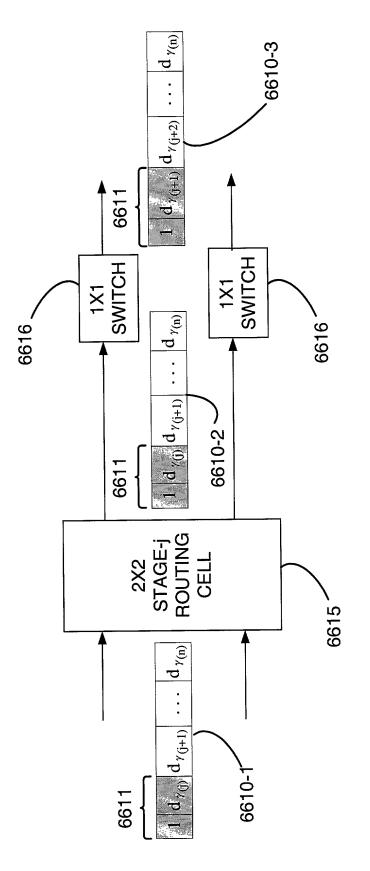
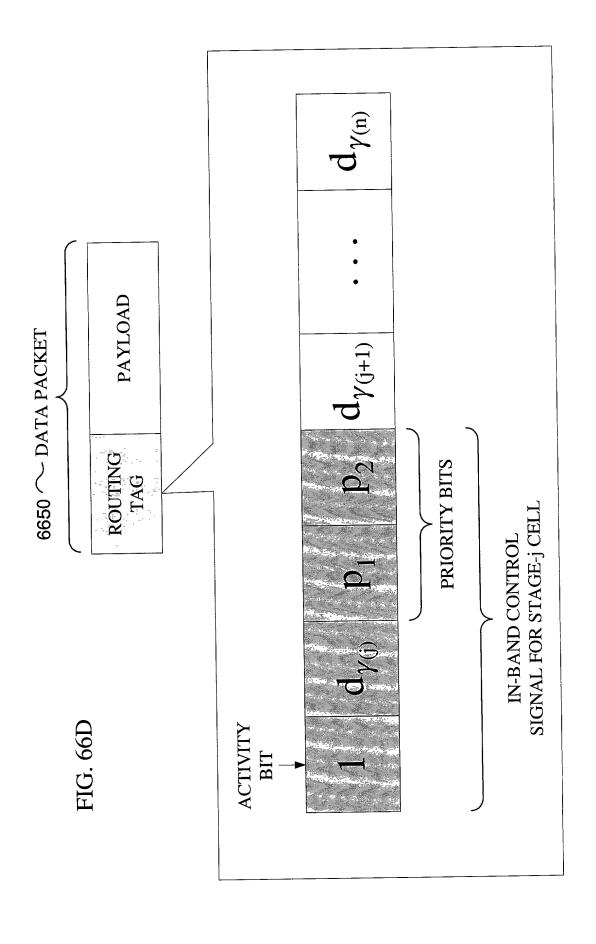
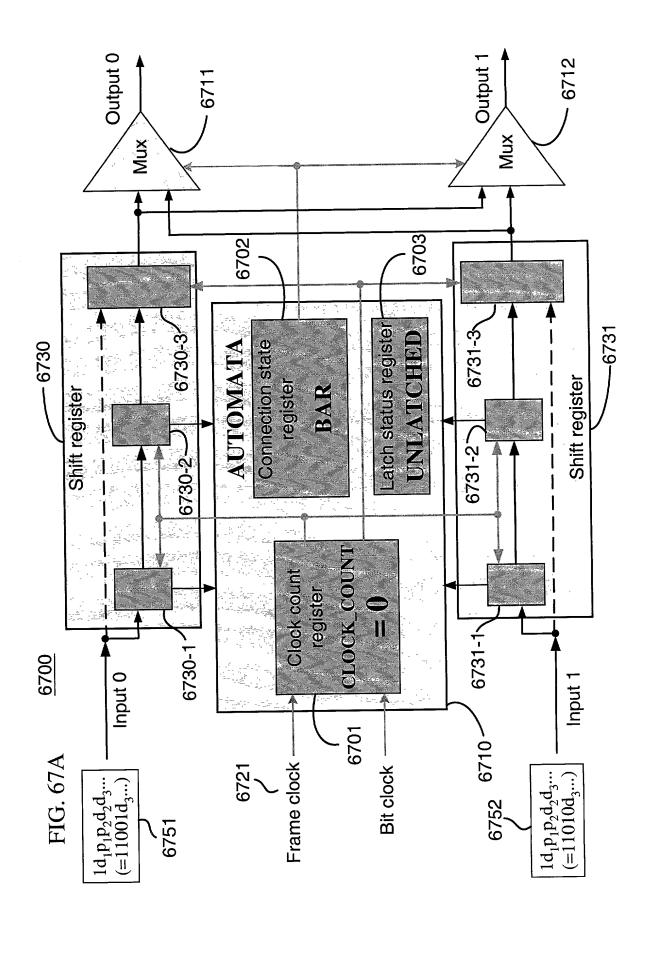
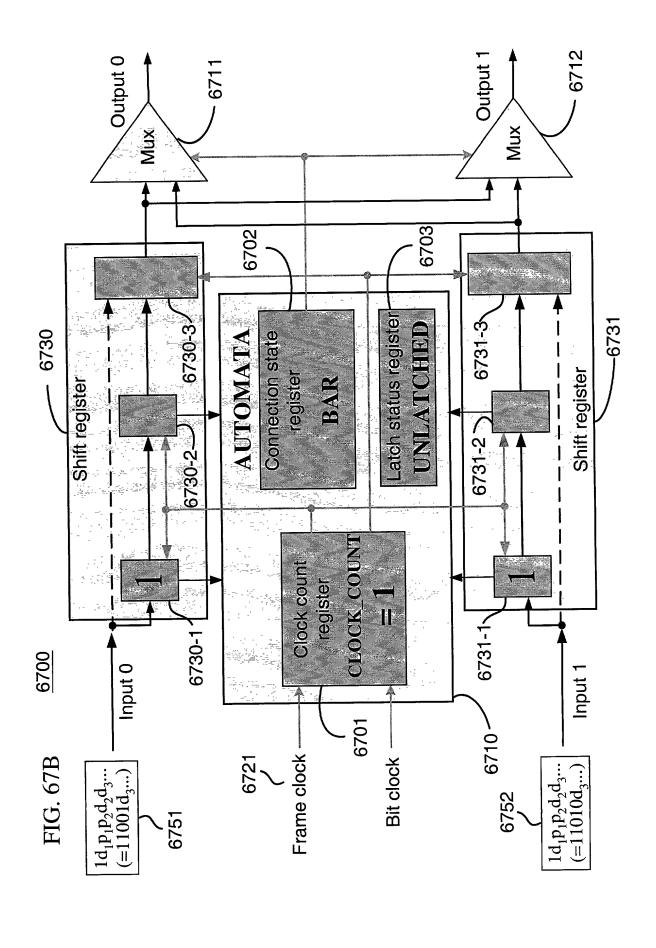
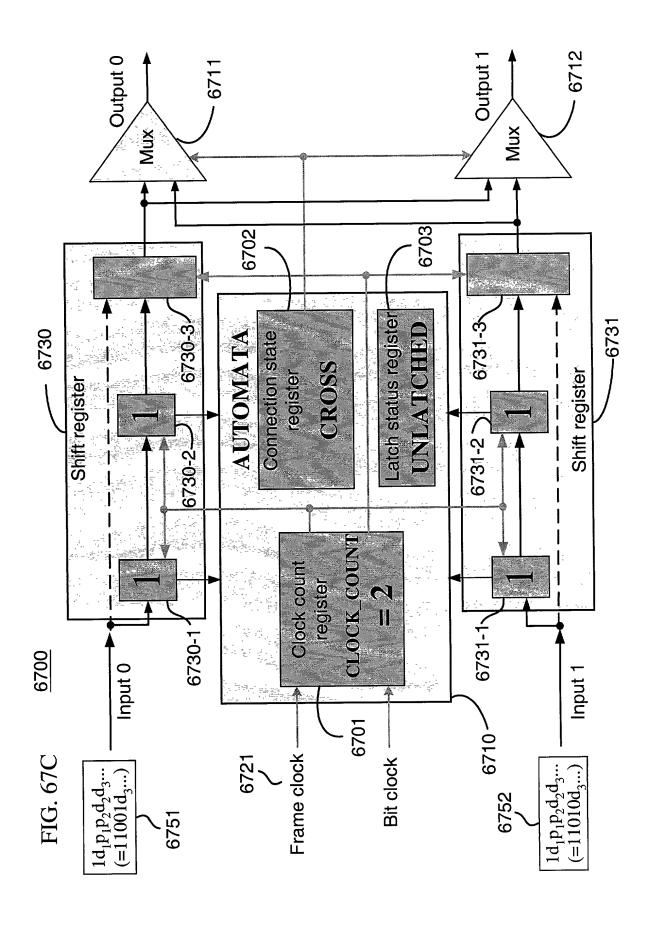


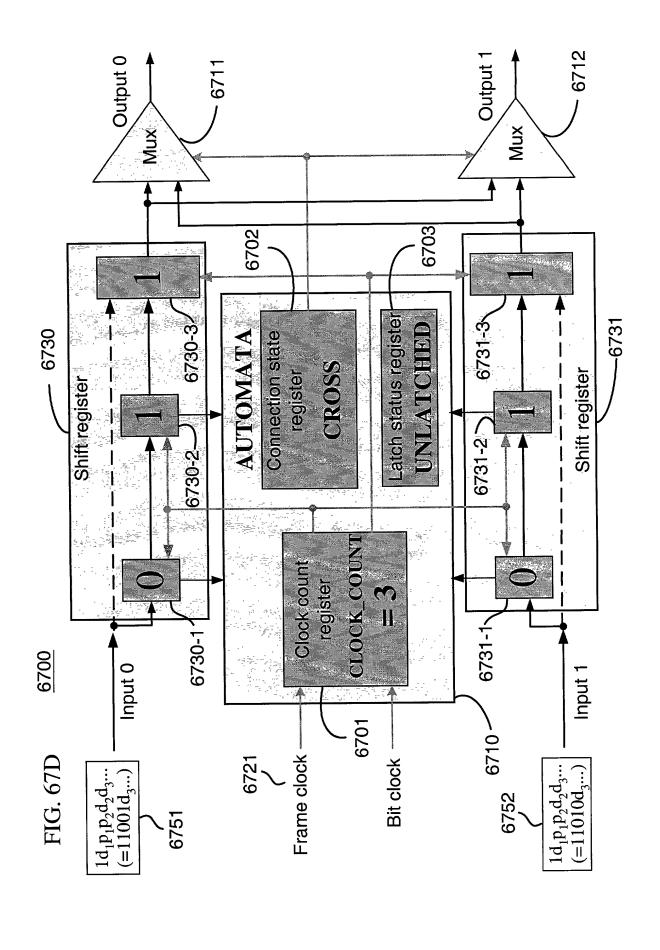
FIG. 66C

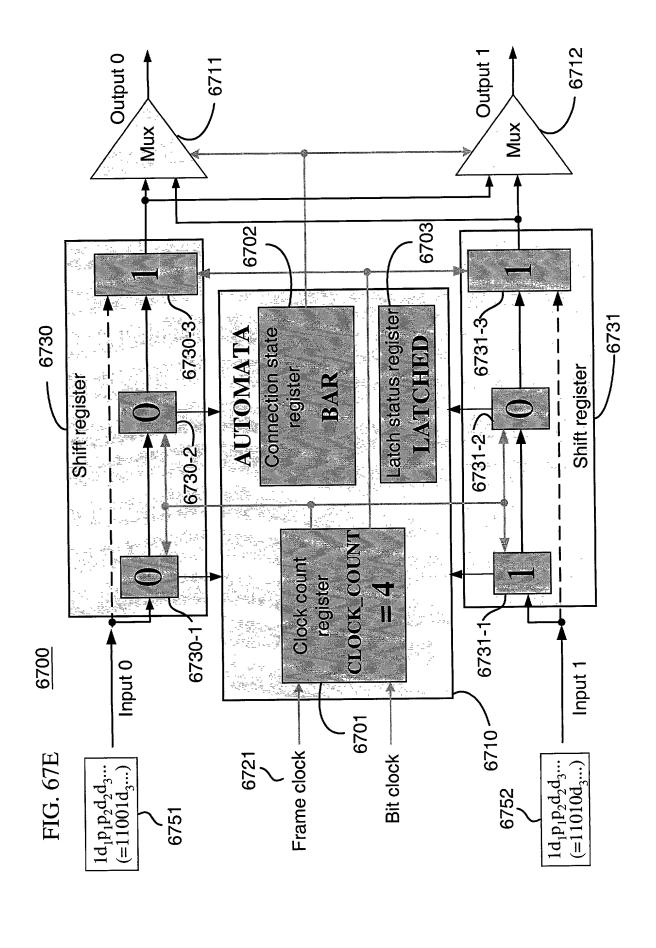


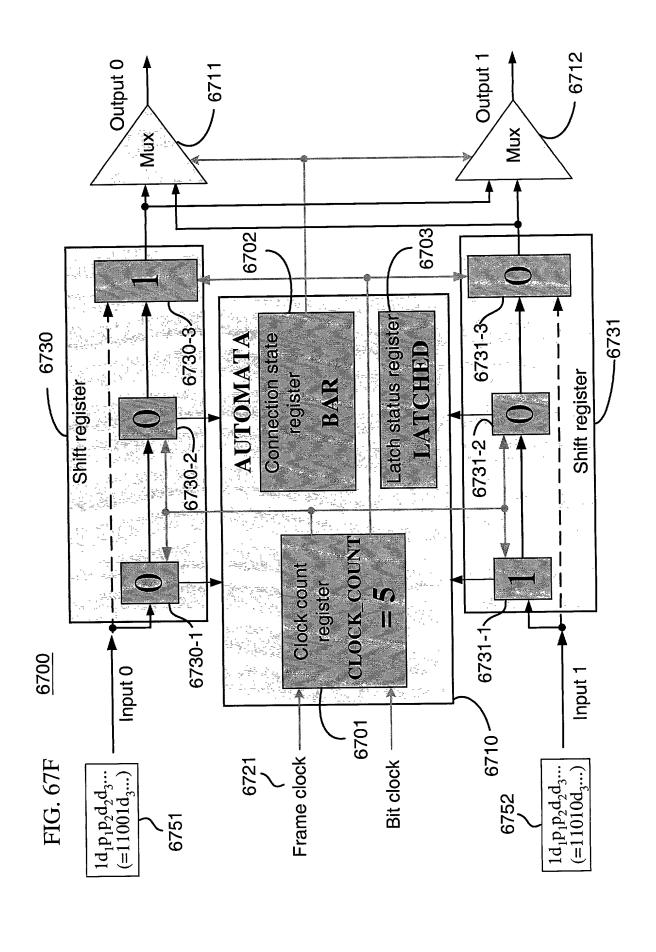












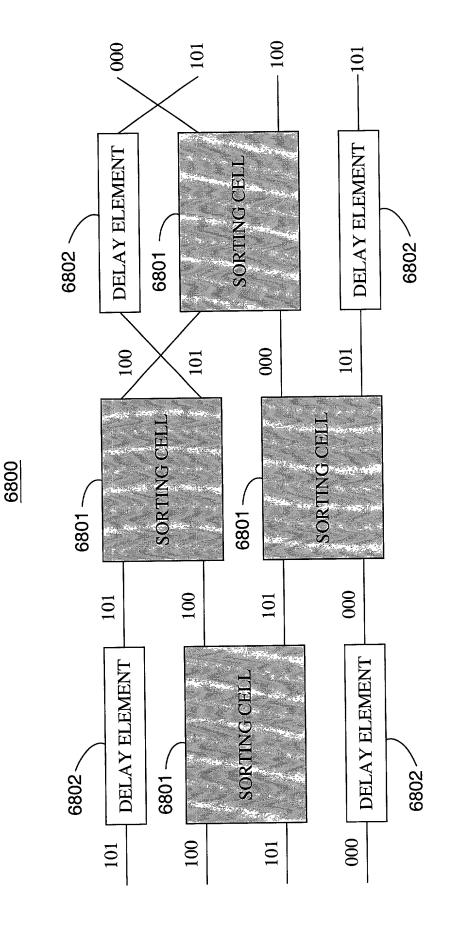
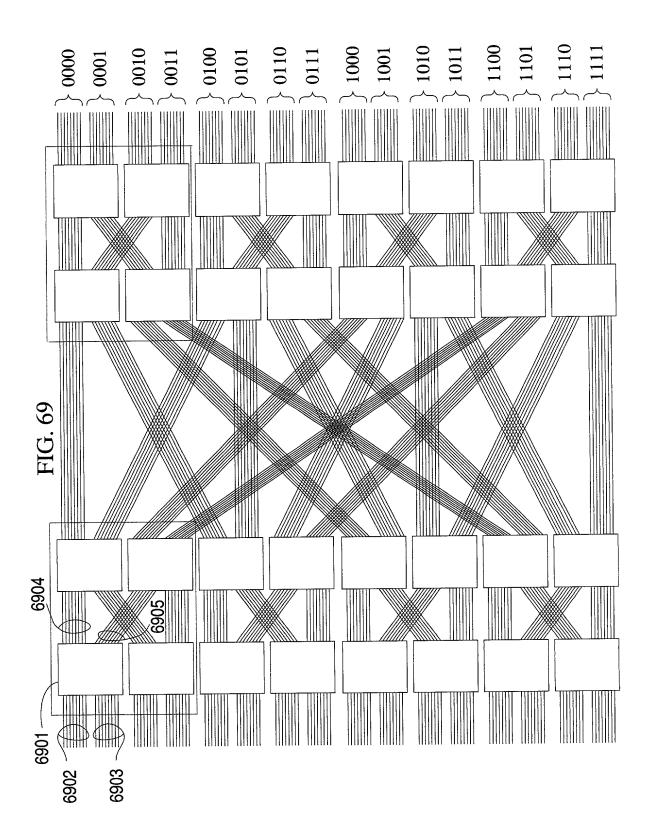
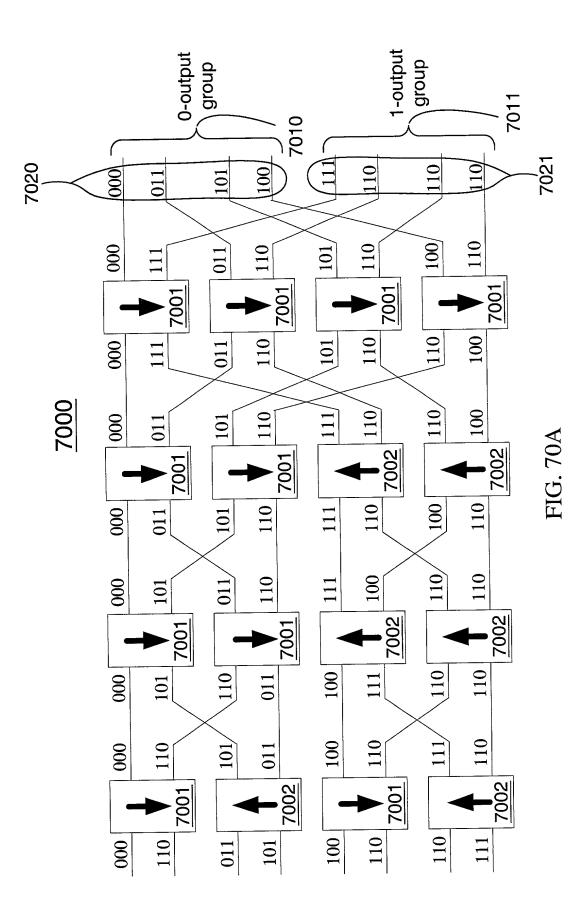
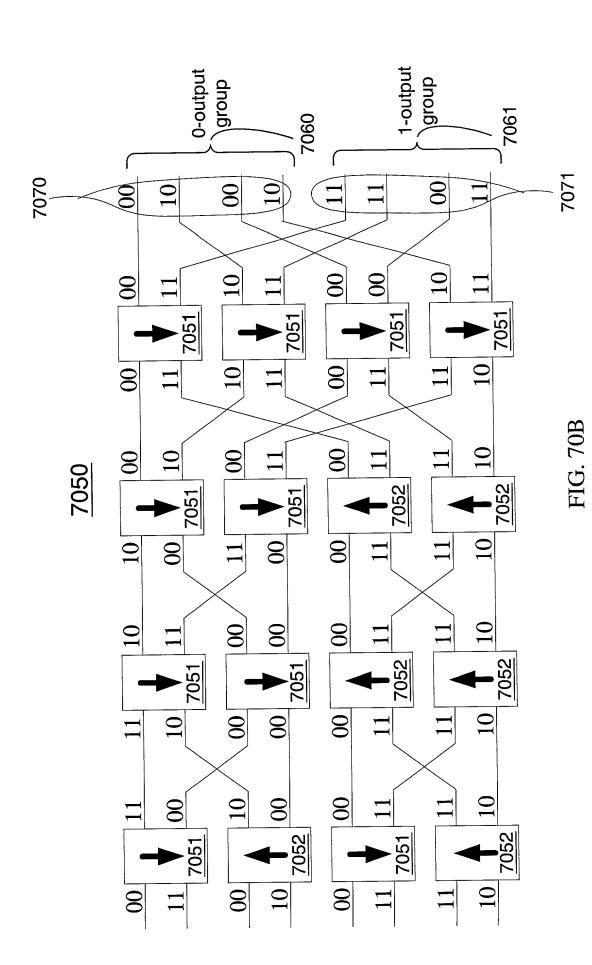


FIG. 68







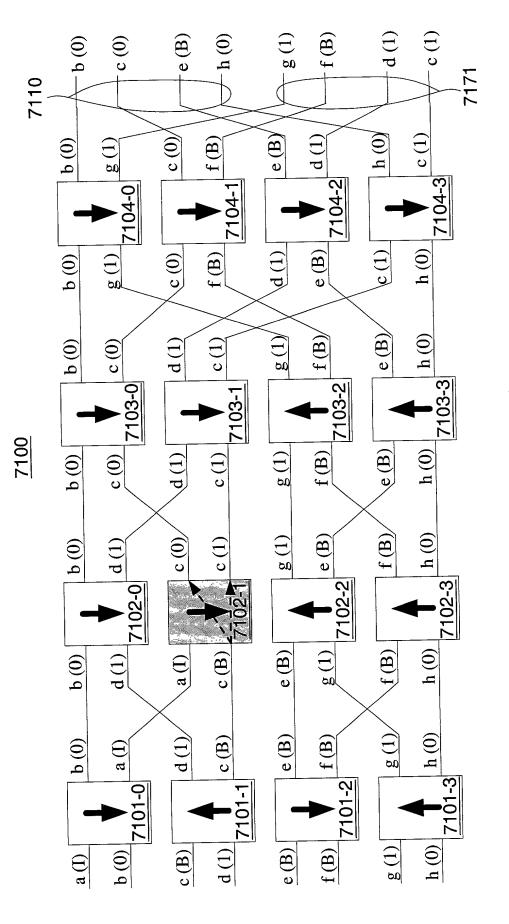


FIG. 71A

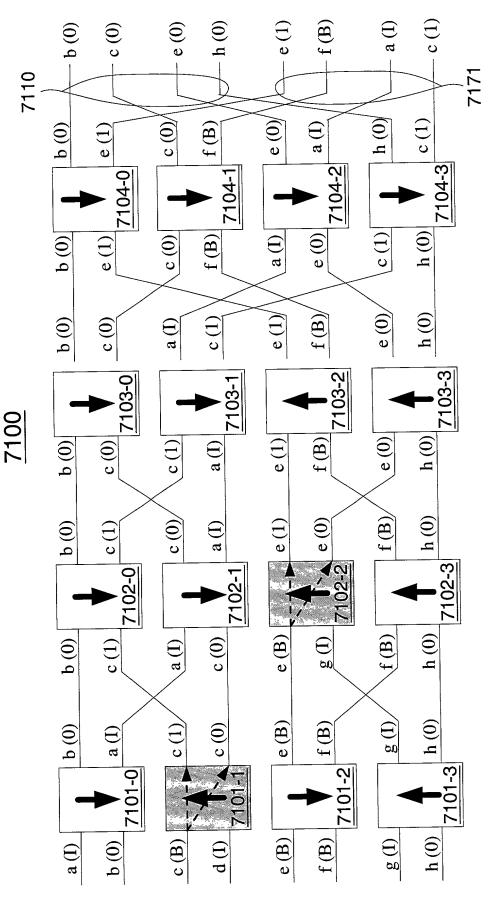


FIG. 71B

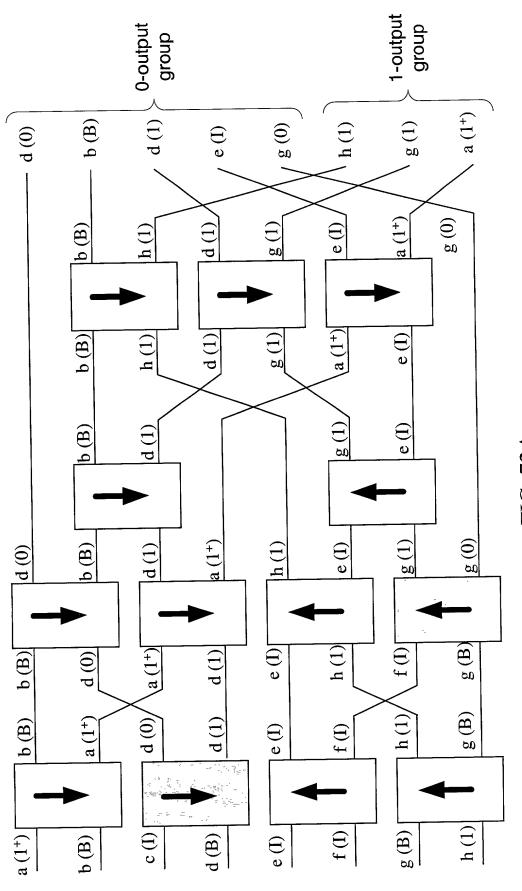
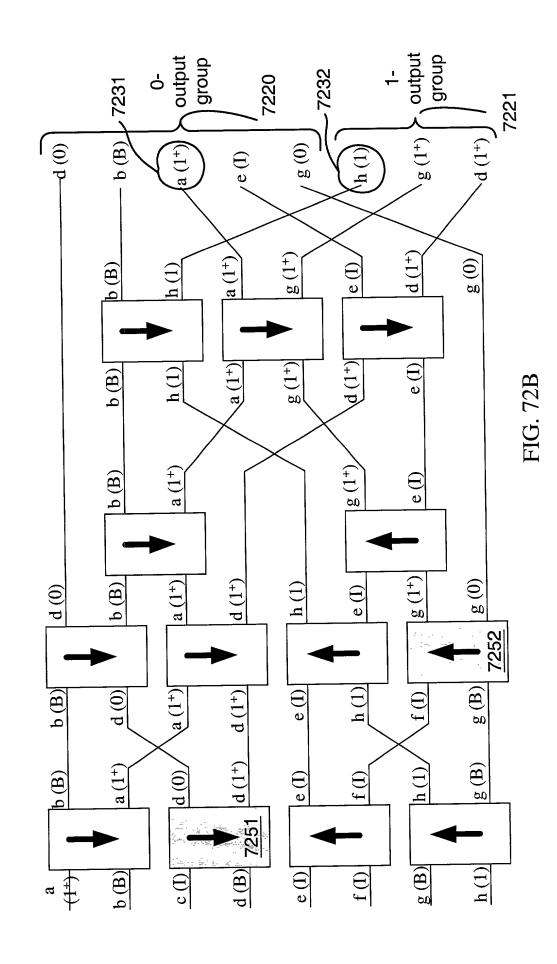
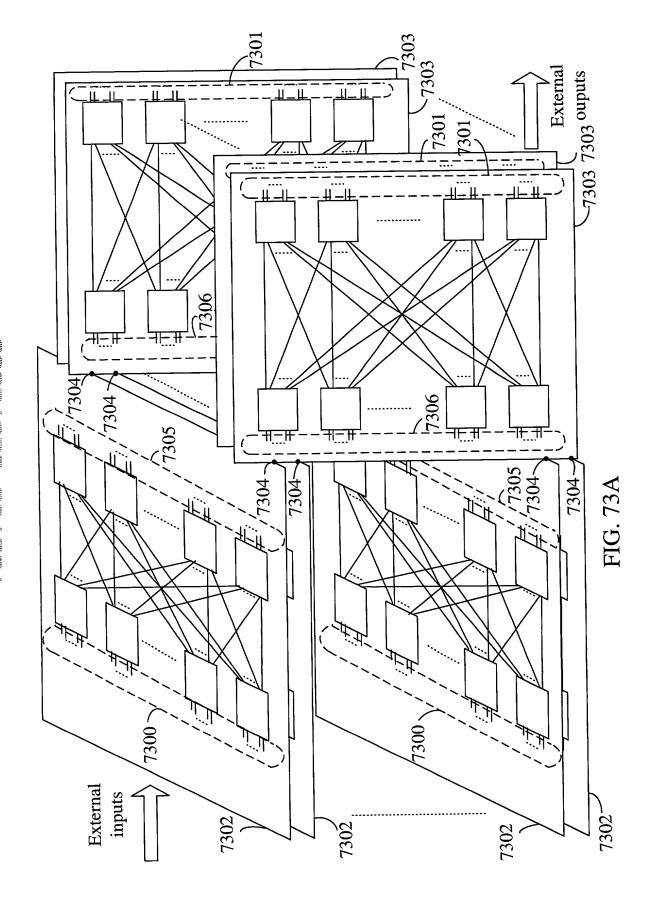
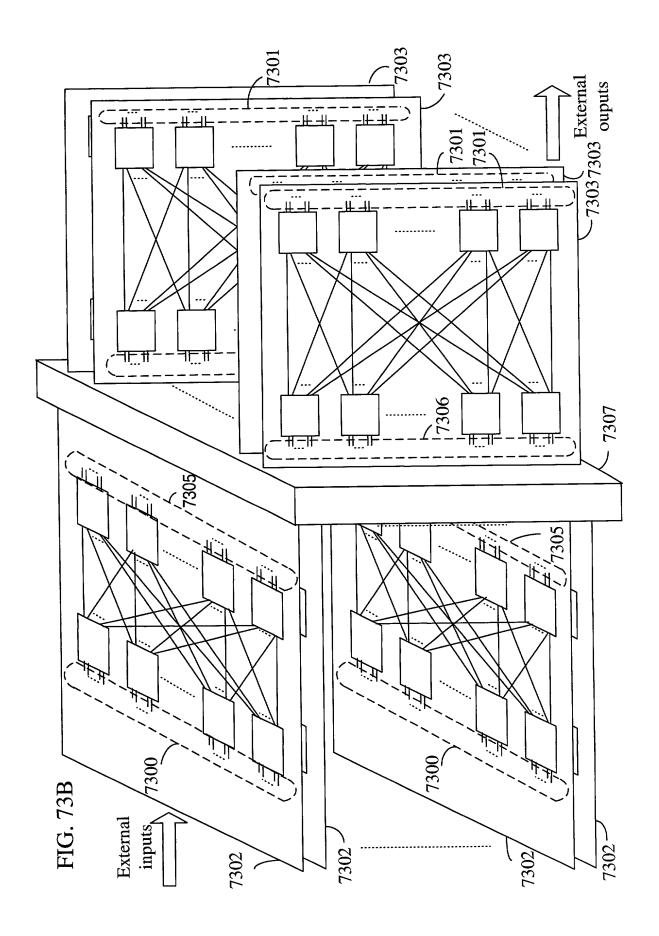
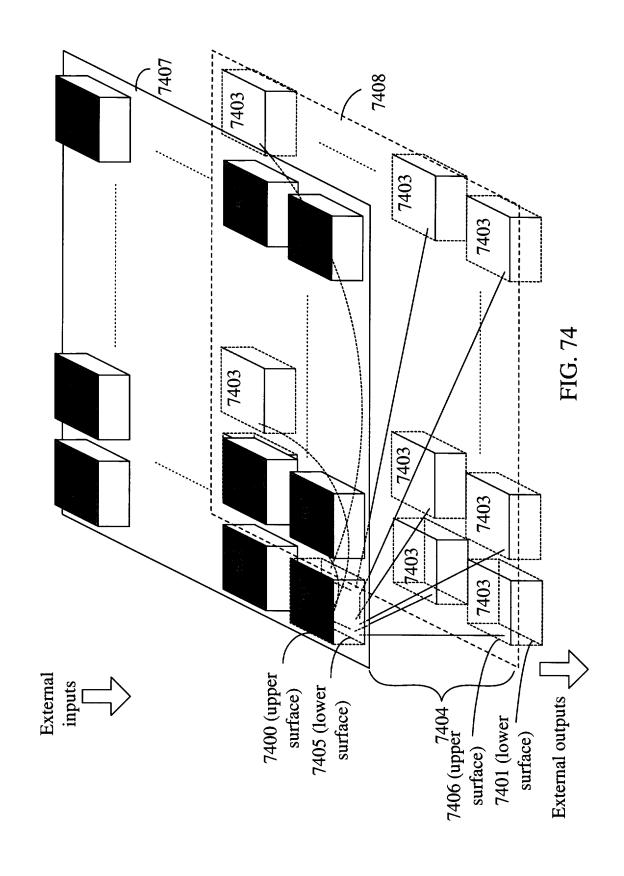


FIG. 72A









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